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ABSTRACT

This handbook, first published in 1975, is the primary educational tool used by the National Collegiate Athletic Association Committee on Competitive Safeguards and Medical Aspects of Sports, and is designed to assist schools in the development of safe intercollegiate athletics programs. The handbook's first section on administrative issues covers sports medicine administration; medical evaluations, immunizations, and records; dispensing prescription medication; and lightning safety. The second section dealing with medical issues covers medical disqualification of the student-athlete; skin infections in wrestling; prevention of heat illness; weight loss/hypohydration; assessment of body composition; eating disorders/anorexia and bulimia; menstrual cycle dysfunction; blood borne pathogens; nontherapeutic drugs; nutritional ergogenic aids; use of local anesthetics; use of injectable corticosteroids for sports injuries; cold stress; "burners," or brachial plexus injuries; and concussion and second-impact syndrome. The third section on special populations covers participation by impaired and pregnant student-athletes and student-athletes with sickle cell trait. The final section on equipment covers protective equipment; eye safety; use of the trampoline and minitramp; mouth guards; use of the head as a weapon in football and other contact sports; and guidelines for fitting and removing helmets. Appended is a NCAA injury surveillance system summary. (JM)

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Distributed to athletics directors, senior woman administrators, faculty athletics representatives, athletic trainers, team physicians, conference commissioners and individual student-athlete advisory committees.

Note: Revisions to the guidelines contained in the NCAA Sports Medicine Handbook may be made on a yearly basis. Between printings of the handbook, revisions will be published in The NCAA News. It is important that persons using this handbook be aware of any such revisions. The NCAA Committee on Competitive Safeguards and Medical Aspects of Sports suggests that such revisions be recorded in the handbook, thereby keeping this publication current. New guidelines and major revisions have been highlighted with gray shading.

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PREFACE

Each fall, the NCAA Sports Medicine Handbook is sent to athletics directors, senior woman administrators, athletic trainers, team physicians and student-athlete advisory committees at each member institution. Since its creation in 1975, the handbook has been the primary educational tool for the NCAA Committee on Competitive Safeguards and Medical Aspects of Sports to assist schools in the development of safe and sound intercollegiate athletics programs. The health and safety principle of the Association's constitution reinforces this objective – it is the responsibility of each member institution to protect the health of and provide a safe environment for each of its participating student-athletes.

The handbook provides guidance in how to achieve this principle. The committee has agreed that guideline topics should be considered only if the topic is relevant to collegiate athletics, of interest to a large population and not addressed in another easily obtained source.

Standard of care is associated with widely recognized and accepted national standards within a profession or related to a specific issue. Standards may be specifically stated or loosely composed of a variety of resources. Guidelines, on the other hand, are interpreted to guide one's professional behavior, not to mandate what one must do. They are recommendations. A guideline is one of perhaps many components to be considered that make up a standard of care.

The NCAA Sports Medicine Handbook consists of guidelines; recommendations for institutions to consider as they develop their individual sports medicine policies. For example, the handbook contains a guideline regarding concussions. At the end of the guideline, there are several different references. These references, as well as the guideline itself, are components of whatever "standard" there may be on this issue.

In situations requiring medical expertise, the proper medical judgment, based on standards and training, should be exercised. It is expected that this judgment may sometimes override a handbook recommendation since unique situations can and do occur across more than 900 member institutions. In the previous example, a decision to return the student-athlete to play may be made after consultation of the handbook guideline or references but ultimately should be based on the clinical judgment (medical training – standard of care) of the team physician.

Please view the NCAA Sports Medicine Handbook as a tool to help you develop your sports medicine administrative policies. Such policies may be unique to your institution but they should reflect as a core, a commitment to student-athlete welfare and an awareness of the information in this book.

1999-2000
Sports Medicine Guidelines

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FOREWORD

Shared Responsibility for Sports Safety

Participation in sports requires an acceptance of risk of injury. Student-athletes rightfully assume that those who are responsible for the conduct of sport have taken reasonable precautions to minimize the risk of significant injury. Periodic analysis of injury patterns continually leads to refinements in the rules and other safety guidelines.

Attempting to legislate safety via rules books and equipment standards, while helpful, is seldom entirely effective. Relying on officials to enforce compliance with rules books is as insufficient in preventing injury as relying on warning labels to produce behavioral compliance with safety guidelines. Compliance implies respect on everyone's part (student-athlete, coach, athletic trainer, physician, athletics director) for the intent and purpose of rules and guidelines.

Student-athletes, for their part, should comply with and understand the rules and standards that govern their sports. Coaches should appropriately acquaint the student-athlete with risks of injury and with the rules and practices they are employing to minimize the student-athlete's risk of significant injury while pursuing the many benefits of sport.

The athletic trainer and team physician should be responsible for injury-prevention efforts (where possible) and the care of those injuries that occur.

The athletics program, via the athletics administrator, should be responsible for providing a safe environment.

The student-athlete and the athletics program have a mutual need for an informed awareness of the risks being accepted and for sharing the responsibility for minimizing those risks.

SPORTS SCIENCES

1 ADMINISTRATIVE ISSUES

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GUIDE LINE 1a
Sports Medicine Administration

October 1977 • Revised August 1999

The following components of a safe athletics program are an important part of injury prevention. They should serve both as a checklist and as a guideline for use by athletics administrators in the development of safe programs.

1. Preparticipation Medical Exam. Before student-athletes accept the rigors of any organized sport, their health should be evaluated. Such an examination should determine whether the student-athlete is prepared to engage in a particular sport.

2. Health Insurance. Each student-athlete should be covered by individual, parental or institutional medical insurance to defray the costs of significant injury or illness.

3. Preseason Preparation. The student-athlete should be protected from premature exposure to the full rigors of sports. Preseason conditioning should provide the student-athlete with optimal readiness by the first practice.

4. Acceptance of Risk. Any informed consent or waiver by student-athletes (or, if minors, by their parents) should be based on an awareness of the risks of participating in intercollegiate sports.

5. Planning/Supervision. Safety in intercollegiate athletics can be attained only by appropriate planning for and supervision of practice, competition and travel.

6. Liability. Liability must be a concern of responsible athletics administrators and coaches. Those who sponsor and govern athletics programs should accept the responsibility of minimizing the risk of injury.

7. Equitable Medical Care. Member institutions should neither practice nor condone discrimination on the basis of race, creed, national origin, sex, age, handicap, disease entity, social status, financial status, sexual orientation or religious affiliation within their sports medicine programs.

Institutional decisions on availability and qualification of medical personnel including certified athletic and quality weight-training and conditioning equipment and facilities, should be based on accepted medical criteria (e.g., rates of injury) and not on the basis of gender or sport.

Member institutions should not place their sports medicine staffs in compromising situations by having them provide inequitable treatment in violation of their medical codes of ethics.

Institutions should be encouraged to incorporate questions regarding adequacy of medical care, with special emphasis on equitable treatment, in exit interviews with student-athletes.

8. Equipment. Purchasers of equipment should be aware of and use safety standards. In addition, attention should be directed to maintaining proper repair and fitting of equipment at all times in all sports. Student-athletes should:

a. Be informed what equipment is mandatory and what constitutes illegal equipment;

b. Be provided the equipment mandated;

c. Be instructed to wear and how to wear mandatory equipment during participation, and

d. Be instructed to notify the coaching staff when equipment becomes unsafe or illegal.

9. Facilities. The adequacy and conditions of the facilities used for particular intercollegiate athletics events should not be overlooked, and periodic examination of the facilities should be conducted. Inspection of the facilities should include not only the competitive area, but also warm-up and adjacent areas.

10. Blood-Borne Pathogens. In 1992, The Occupational Safety and

Health Administration (OSHA) developed a standard directed to minimizing or eliminating occupational exposure to blood-borne pathogens. Each member institution should determine the applicability of the OSHA standard to its personnel and facilities.

11. **Emergency Care.** Reasonable attention to all possible preventive measures will not eliminate sports injuries. Each scheduled practice or contest of an institution-sponsored intercollegiate athletics event, as well as out-of-season practices and skills sessions, should include an emergency plan. Like student-athlete welfare in general, a plan is a shared responsibility of the athletics department; administrators, coaches and medical personnel should all play a role in the establishment of the plan, procurement of resources and understanding by all parties. Components of such a plan should include:

a. The presence of a person qualified and delegated to render emergency care to a stricken participant;

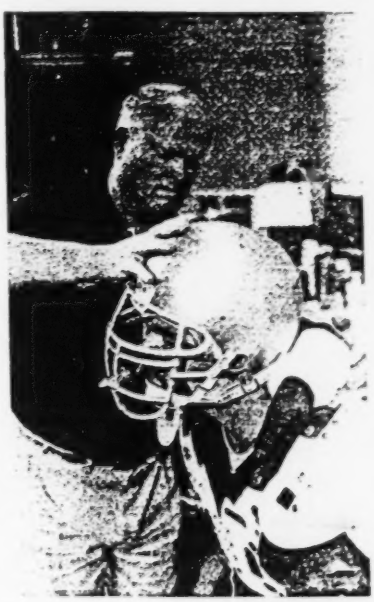
b. The presence or planned access to a physician for prompt medical evaluation of the situation, when warranted;

c. Planned access to a medical facility, including a plan for communication and transportation between the athletics site and the medical facility for prompt medical services, when warranted. Access to a working telephone or other telecommunications device, whether fixed or mobile, should be assured;

d. All necessary emergency equipment should be at the site or quickly accessible. Equipment should be in good operating condition, and personnel must be trained in advance to use it properly. Additionally, emergency information about the student-athlete should be available both at home and on the road for use by medical personnel; and

e. A thorough understanding by all parties, including the leadership of visiting teams, of the personnel and procedures associated with the emergency-care plan; and

f. Certification in cardiopulmonary resuscitation techniques (CPR), first aid, and prevention of disease transmission (as outlined by OSHA guidelines) should be required for all athletics personnel associated with practices, competitions, skills instruction, and strength and conditioning. New staff engaged in these activities should comply with these rules within six months of employment.



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GUIDE LINE 1b
Medical Evaluations, Immunizations and Records

July 1977 • Revised June 1998

Preparticipation medical evaluation. A preparticipation medical evaluation should be required upon a student-athlete's entrance into the institution's intercollegiate athletics program. This initial evaluation should include a comprehensive health history, immunization history as defined by current Centers for Disease Control and Prevention (CDC) guidelines and a relevant physical exam, part of which should include an orthopedic evaluation. Subsequent to the initial medical evaluation, an updated history should be performed annually. Further preparticipation physical examinations are not believed to be necessary unless warranted by the updated history.

The American Heart Association has modified its 1996 recommendation for a cardiovascular screening every two years for collegiate athletes.[2] The revision[3] recommends cardiovascular screening as a part of the physical exam required upon a student-athlete's entrance into the intercollegiate athletics program. In subsequent years, an interim history and blood pressure measurement should be made. Important changes in medical status or abnormalities may require more formal cardiovascular evaluation.

Medical records. Student-athletes have a responsibility to report any changes in their health to the team's health-care provider. Medical records should be maintained during the student-athlete's collegiate career and should include:

1. A record of injuries, illnesses, pregnancies and operations, whether sustained during the competitive season or the off-season;

2. Referrals for and feedback from consultation, treatment or rehabilitation;

3. Subsequent care and clearances;

4. A comprehensive entry-year health-status questionnaire and an updated health-status questionnaire each year thereafter. The health history should include, at a minimum, questions concerning:

   a. Chronic illness, recent acute illness, previous hospitalization and surgery;

   b. Allergies, including hypersensitivity to drugs, foods and insect bites/stings;

   c. Medicines taken on a regular basis;

   d. Recent conditioning status;

   e. Previous and current injuries to the musculoskeletal system;

   f. Previous concussion or loss of consciousness;

   g. Syncope or near syncope with exercise;

   h. Symptoms of exercise-induced bronchospasm;

   i. Loss of paired-organ function (eye, kidney or testicle);

   j. History of a heat-related illness;

   k. Cardiac symptoms, history of cardiac disease;

   l. Family history:

      1. Sudden death in a family member under the age of 50 from nontraumatic causes;

      2. Family history of Marfan syndrome; and

   m. Menstrual history;

   n. Possible exposure to tuberculosis;

5. Immunizations. It is recommended that student-athletes be immunized for the following:

   a. Measles, mumps, rubella (MMR);

   b. Hepatitis B;

c. Diptheria, tetanus (and boosters when appropriate); and

6. Written permission, signed by the student-athlete, that authorizes the release of medical information to others. Such permission should specify all persons to whom the student-athlete intends the information to be released. The consent also should specify whether all or only some of the information may be released.

Note: A training record is a medical record, and therefore is subject to state and federal laws with regard to confidentiality and content. Each institution should obtain from appropriate legal counsel an opinion regarding the confidentiality and content of such records in its state. Training-room records and the information they contain should be created, maintained and released in accordance with clear written guidelines based on this opinion. All personnel who have access to training-room records should be familiar with such guidelines and informed of their role in maintaining the student-athlete's right to privacy.

Follow-up or exit examinations. Pregnant student-athletes or those who have sustained a significant injury or illness during the sport season should be given a follow-up examination to re-establish "playability" before resuming participation in a particular sport. This is especially relevant if the event occurred before the student-athlete left the institution for summer break. Clearance for individuals to return to activity is solely the responsibility of the team physician or that physician's designated representative. An exit evaluation at the conclusion of that student-athlete's participation also is recommended.

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GUIDE LINE 1c
Dispensing Prescription Medication

May 1986 • Revised June 1998

Research sponsored by the NCAA has shown that prescription medications have been provided to student-athletes by individuals other than persons legally authorized to dispense such medications. This is an important concern because the improper dispensing of both prescription and non-prescription drugs can lead to serious medical and legal consequences.

Research also has shown that state and federal regulations regarding packaging, labeling, records keeping and storage of medications have been overlooked or disregarded in the dispensing of medications from the training room. Moreover, many states have strict regulations regarding packaging, labeling, records keeping and storage of prescription and nonprescription medications. Athletic departments must be concerned about the risks to the student-athletes when these regulations are not followed.

Administering drugs and dispensing drugs are two separate functions. Administration generally refers to the direct application of a single dose of drug. Dispensing is defined as preparing, packaging and labeling a prescription drug or device for subsequent use by a patient. Physicians cannot delegate to athletic trainers the authority for dispensing prescription medications under current medication-dispensing laws, since athletic trainers are not authorized by law to dispense under any circumstances. The improper delegation of authority by the physician or the dispensing of prescription medications by the athletic trainer (even with permission of the physician), places both parties at risk for legal liability.

If athletics departments choose to provide prescription and/or nonprescription medications, they must comply with the applicable state and federal laws for doing so. It is strongly encouraged that athletics departments and their team physicians work with their on-site or area pharmacists to develop specific policies.

The following items form a minimal framework for an optimal drug-distribution program in a college-athletics environment. Since there is extreme variability in state laws, it is imperative for each institution to work with local authorities in order to be in full compliance.

1. Drug-dispensing practices are subject to and should be in compliance with all state, federal and Drug Enforcement Agency (DEA) regulations. Relevant items include appropriate packaging, labeling, counseling and education, records keeping, and accountability for all drugs dispensed.

2. Certified athletic trainers should not be assigned duties that may be performed only by physicians or pharmacists. A team physician cannot delegate diagnosis, prescription-drug control, or prescription-dispensing duties to athletic trainers. These duties extend beyond the licensing and qualifications of a certified athletic trainer.

3. Drug-distribution records should be created and maintained where dispensing occurs in accordance with appropriate legal guidelines. The record should be current and easily accessible by appropriate medical personnel.

4. All prescription and over-the-counter (OTC) medications should be stored in designated areas that assure proper environmental (dry with temperatures between 59 and 86 degrees Fahrenheit) and security conditions.

5. All drug stocks should be examined at regular intervals for removal of any outdated, deteriorated or recalled medications.

6. All emergency and travel kits containing prescription and OTC drugs should be routinely inspected

for drug quality and security.

7. Individuals receiving medication should be properly informed about what they are taking and how they should take it. Drug allergies, chronic medical conditions and concurrent medication use should be readily retrievable in the training-room record.

8. Follow-up should be performed to be sure student-athletes are complying with the drug regimen and to ensure that drug therapy is effective.

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GUIDE LINE 1d
Lightning Safety

July 1997 • Revised June 1998

The NCAA Committee on Competitive Safeguards and Medical Aspects of Sports acknowledges the significant input of Brian L. Bennett, ATC, College of William and Mary and Ronald L. Holle and Raul Lopez of the National Severe Storms Laboratory in the development of this guideline.

Lightning is the most consistent and significant weather hazard that may affect intercollegiate athletics. Within the United States, the National Severe Storms Laboratory (NSSL) estimates that 100 fatalities and 400-500 injuries requiring medical treatment occur from lightning strikes every year. While the probability of being struck by lightning is extremely low, the odds are significantly greater when a storm is in the area and the proper safety precautions are not followed.

Prevention and education are the keys to lightning safety. Education begins with background information on lightning. The references associated with this guideline are an appropriate resource. Prevention should begin long before any intercollegiate athletics event or practice. The following steps are recommended by the NCAA and NSSL to mitigate the lightning hazard:

1. Designate a chain of command as to who monitors threatening weather and who makes the decision to remove a team or individuals from an athletics site or event. An emergency plan should include planned instructions for participants as well as spectators.

2. Obtain a weather report each day before a practice or event. Be aware of potential thunderstorms that may form during scheduled intercollegiate athletics events or practices.

3. Be aware of National Weather Service-issued (NWS) thunderstorm "watches" and "warnings" as well as the signs of thunderstorms developing nearby. A "watch" means conditions are favorable for severe weather to develop in an area; a "warning" means that severe weather has been reported in an area and for everyone to take proper precautions.

4. Know where the closest "safe structure or location" is to the field or playing area, and know how long it takes to get to that safe structure or location.

Safe structure or location is defined as:

a. Any building normally occupied or frequently used by people, i.e., a building with plumbing and/or electrical wiring that acts to electrically ground the structure. Avoid using shower facilities for safe shelter and **do not use** the showers or plumbing facilities during a thunderstorm.

b. In the absence of a sturdy, frequently inhabited building, any vehicle with a hard metal roof (not a convertible or golf cart) and rolled-up windows can provide a measure of safety. A vehicle is certainly better than remaining outdoors. It is not the rubber tires that make a vehicle a safe shelter, but the hard metal roof which dissipates the lightning strike around the vehicle. DO NOT TOUCH THE SIDES OF THE VEHICLE!

5. Be aware of how close lightning is occurring. The flash-to-bang method is the easiest and most convenient way to estimate how far away lightning is occurring. Thunder always accompanies lightning, even though its audible range can be diminished due to background noise in the immediate environment, and its distance from the observer. To use the flash-to-bang method, count the seconds from the time the lightning is sighted to when the clap of thunder is heard. Divide this number by five to obtain how far away (in miles) the lightning is occurring. For example, if an individual counts 15 seconds between

seeing the flash and hearing the bang, 15 divided by five equals three; therefore, the lightning flash is approximately three miles away.

Lightning awareness should be increased with the first flash of lightning or the first clap of thunder, no matter how far away. This activity must be treated as a wake-up call to intercollegiate athletics personnel. The most important aspect to monitor is how far away the lightning is occurring, and how fast the storm is approaching, relative to the distance of a safe shelter.

Specific lightning-safety guidelines have been developed with the assistance of the National Severe Storms Laboratory (NSSL).

1. As a minimum, NSSL staff strongly recommend that by the time the monitor obtains a flash-to-bang count of **30** seconds, all individuals should have left the athletics site and reached a safe structure or location. Athletics events may need to be terminated.

2. The existence of blue sky and the absence of rain are not protection from lightning. Lightning can, and does, strike as far as 10 miles away from the rain shaft. It does not have to be raining for lightning to strike.

3. If no safe structure or location is within a reasonable distance, find a thick grove of small trees surrounded by taller trees or a dry ditch. Assume a crouched position on the ground with only the balls of the feet touching the ground, wrap your arms around your knees and lower your head. Minimize contact with the ground, because lightning current often enters a victim through the ground rather than by a direct overhead strike. **MINIMIZE YOUR BODY'S SURFACE AREA, AND MINIMIZE CONTACT WITH THE GROUND! DO NOT LIE FLAT!** If unable to reach safe shelter, stay away from the tallest trees or objects (such as light poles or flag poles), metal objects (such as fences or bleachers), individual trees, standing pools of water, and open fields. Avoid being the highest object in a field. Do not take shelter under a single, tall tree.

4. A person who feels his or her hair stand on end, or skin tingle, should immediately crouch, as described in item 3.

5. Avoid using the telephone, except in emergency situations. People have been struck by lightning while using a land-line telephone. A cellular phone or a portable remote phone is a safe alternative to land-line phones, if the person and the antenna are located within a safe structure or location, and if all other precautions are followed.

6. When considering resumption of an athletics activity, NSSL staff recommends that everyone should ideally wait at least 30 minutes after the last flash of lightning or sound of thunder before returning to the field or activity.

7. People who have been struck by lightning **do not** carry an electrical charge. Therefore, cardiopulmonary resuscitation (CPR) is safe for the responder. If possible, an injured person should be moved to a safer location before starting CPR. Lightning-strike victims who show signs of cardiac or respiratory arrest need emergency help quickly. Prompt, aggressive CPR has been highly effective for the survival of victims of lightning strikes.

Note: Commercial weather warning services with sophisticated cloud-to-ground lightning detection devices are available. They may offer a cost effective, efficient method of making accurate, timely decisions on location and movement of lightning storms. Such services are helpful in making decisions regarding stoppage of play, practice, evacuation and return to activity.

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SPORTS SCIENCES

2

MEDICAL ISSUES

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NCAA®
GUIDE LINE 2a
Medical Disqualification of the Student-Athlete

January 1979 • Revised June 1993

Withholding a student-athlete from activity. The team physician has the final responsibility to determine when a student-athlete is removed or withheld from participation due to an injury, an illness or pregnancy. In addition, clearance for that individual to return to activity is solely the responsibility of the team physician or that physician's designated representative.

Procedure to medically disqualify a student-athlete during an NCAA championship. The student-athlete's team physician should examine the individual with an injury, an illness or pregnancy and make a recommendation to the student-athlete, to the individual's coach, and to the chair of the governing sports committee (or a designated representative) as to the advisability of continued participation or disqualification. In the absence of a team physician, the NCAA tournament physician, as designated by the host school, should examine the student-athlete and make such a recommendation. The chair of the governing sports committee (or a designated representative) should be responsible for administrative enforcement of the medical recommendation if it involves disqualification.

NCAA®
GUIDE LINE 2b
Skin Infections in Wrestling

July 1981 • Revised June 1994

Data from the NCAA Injury Surveillance System (ISS) indicate that skin infections are associated with at least 10 percent of the time-loss injuries in wrestling. It is recommended that qualified personnel examine the skin over the entire body, and the hair of the scalp and pubic areas of all wrestlers before any participation in the sport.

Open wounds and infectious skin conditions that cannot be adequately protected should be considered cause for medical disqualification from practice or competition. Categories of such skin conditions and examples include:

1. Bacterial skin infections
   - a. impetigo;
   - b. erysipelas;
   - c. carbuncle;
   - d. staphylococcal disease;
   - e. folliculitis (generalized);
   - f. hidradentitis suppurativa;
2. Parasitic skin infections
   - a. pediculosis;
   - b. scabies;
3. Viral skin infections
   - a. herpes simplex;
   - b. herpes zoster (chicken pox);
   - c. molluscum contagiosum and
4. Fungal skin infections—tinea corporis (ringworm).

Note: Current knowledge indicates that many fungal infections are easily transmitted by skin-to-skin contact. In most cases, these skin conditions can be covered with a securely attached bandage or nonpermeable patch to allow participation.

Besides identification of infected individuals and their prompt treatment, prevention can be aided through proper routine cleaning of all equipment, including mats and shared common areas, such as locker rooms.

This guideline is intended for general information only. Team physicians, athletic trainers, coaches and others who work directly with wrestling should refer to the 1999 NCAA Wrestling Rules Book or the 1999 Wrestling Championships Handbook for specific rules regarding skin infections.

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NCAA®
GUIDE LINE 2c
Prevention of Heat Illness

June 1975 • Revised June 1998

Practice or competition in hot and/or humid environmental conditions poses special problems for student-athletes. Heat stress and resulting heat illness is a primary concern in these conditions. Although deaths from heat illness are rare, constant surveillance and education are necessary to prevent heat-related problems. The following practices should be observed:

1. An initial complete medical history and physical evaluation, followed by the completion of a yearly health-status questionnaire before practice begins, should be required. A history of previous heat illness, and the type and duration of training activities for the previous month, also are essential.

2. Prevention of heat illness begins with aerobic conditioning, which provides partial acclimatization to the heat. Student-athletes should gradually increase exposure to hot and/or humid environmental conditions over a period of seven to 10 days to achieve heat acclimatization. Each exposure should involve a gradual increase in the intensity and duration of exercise until the exercise is comparable to that likely to occur in competition. When conditions are extreme, training or competition should be held during a cooler time of day. Hydration should be maintained during training and acclimatization.

3. Clothing and protective gear can increase heat stress. Dark colors absorb solar radiation, and clothing and protective gear interfere with the evaporation of sweat and other avenues of heat loss. Frequent rest periods should be scheduled so that the gear and clothing can be loosened to allow heat loss. During the acclimatization process, it may be advisable to use a minimum of protective gear and clothing and to practice in T-shirts, shorts, socks and shoes. Excessive tape and outer clothing that restrict sweat evaporation should be avoided. Rubberized suits should never be used.

4. To identify heat stress conditions, regular measurements of environmental conditions are recommended. Use the ambient temperature and humidity to assess heat stress (see Figure 1). Utilize the wet-bulb temperature, dry-bulb temperature and globe temperature to assess the potential impact of humidity, air temperature and solar radiation. A wet-bulb temperature higher than 75 degrees Fahrenheit (24 degrees Celsius) or warm-weather humidity above 90 percent may represent dangerous conditions, especially if the sun is shining or the athletes are not acclimatized. A wet-bulb globe temperature (WBGT) higher than 82 degrees Fahrenheit (28 degrees Celsius) suggests that careful control of all activity be undertaken.

5. Dehydration (hypohydration) must be avoided not only because it hinders performance, but also

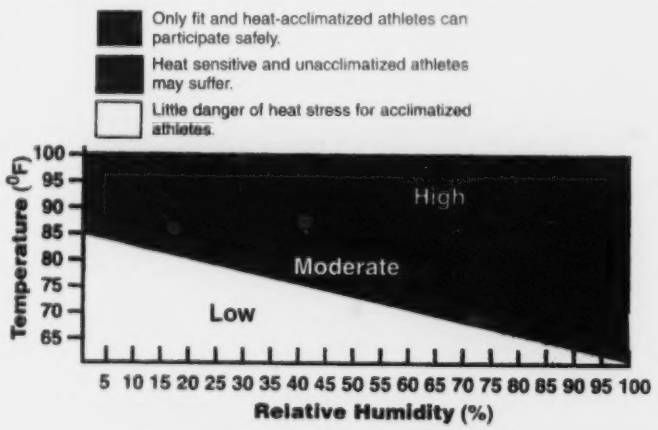

Figure 1: Temperature-Humidity Activity Index

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because it can result in profound heat illness. Fluid replacement must be readily available. Student-athletes should be encouraged to drink as much and as frequently as comfort allows. They should drink one to two cups of water in the hour preceeding practice or competition, and continue drinking during activity (every 15-20 minutes). For activity up to two hours in duration, most weight loss represents water loss, and that fluid loss should be replaced as soon as possible. Following activity, the athlete should rehydrate with a volume that exceeds the amount lost during the activity. A two-pound weight loss represents approximately one quart of fluid loss.

Carbohydrate/electrolyte drinks, while not necessary to maintain performance, seem to enhance fluid intake. If carbohydrate-replacement fluids are provided, care must be taken to ensure adequate gastric emptying of the fluid. Therefore, carbohydrate concentration should not exceed eight percent. Electrolyte solutions are seldom necessary since sodium and potassium should be maintained with a normal diet.

6. By recording the body weight of each student-athlete before and after workout or practice, progressive hypohydration or loss of body fluids can be detected, and the potential harmful effects of hypohydration can be avoided. Those who lose five percent of their body weight or more over a period of several days should be evaluated medically and their activity restricted until rehydration has occurred.

7. Some student-athletes may be more susceptible to heat illness. Susceptible individuals include those with: inadequate acclimatization or aerobic fitness, excess body fat, a history of heat illness, a febrile condition, inadequate rehydration, and those who regularly push themselves to capacity. Also, prescription and over-the-counter drugs, such as antihistamines and pseudoephedrine, may increase the risk of heat illness.

Prevention of Heat Illness

8. Student-athletes should be informed of and monitored for signs of heat illness such as: cessation of sweating, weakness, cramping, rapid and weak pulse, pale or flushed skin, excessive fatigue, nausea, unsteadiness, disturbance of vision and incoherency. If heat illness is suspected, prompt emergency treatment is recommended. When training in hot and/or humid conditions, athletes should train with a partner or be under observation by a coach or athletic trainer.

First aid for heat illness

Heat exhaustion—Symptoms usually include profound weakness and exhaustion, and often dizziness, syncope, muscle cramps and nausea. Heat exhaustion is a form of shock due to depletion of body fluids. First aid should include rest in a cool, shaded environment. Fluids should be given orally. A physician should determine the need for electrolytes and additional medical care. Although rapid recovery is not unusual, student-athletes suffering from heat exhaustion should not be allowed to practice or compete for the remainder of that day.

Heatstroke—Heatstroke is a medical emergency. Medical care must be obtained at once; a delay in treatment can be fatal. This condition is characterized by a very high body temperature and usually (but not always) a hot, dry skin, which indicates failure of the primary temperature-regulating mechanism (sweating), and possibly seizure or coma. First aid includes immediate cooling of the body without causing the student-athlete to shiver. Recommended methods for cooling include using ice, immersion in cold water, or wetting the body and fanning vigorously. Victims of heatstroke should be hospitalized and monitored carefully.

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NCAA®
GUIDE LINE 2d
Weight Loss–Hypohydration

July 1985 • Revised June 1998

There are two general types of weight loss common to student-athletes who participate in intercollegiate sports: loss of body water (at issue here) or loss of body lipid (fat) and body tissue. Dehydration, the loss of body water, leads to a state of negative water balance called hypohydration. It is brought about by withholding fluids and carbohydrates, the promotion of extensive sweating and the use of emetics, diuretics or laxatives. The problem is most evident in those who must be certified to participate in a given weight class, but it also is present in other athletics groups.

There is no valid reason for subjecting the student-athlete's body to intentional dehydration, which can lead to a variety of adverse physiological effects, including significant pathology and even death. Dehydration in excess of 3-5 percent leads to reduced strength and local muscular endurance, reduced plasma and blood volume, compromised cardiac output (elevated heart rate, smaller stroke volume), impaired thermoregulation, decreased kidney blood flow and filtration, reduced liver glycogen stores and loss of electrolytes. Pathological responses include life-threatening heat illness, rhabdomyolysis (severe muscle breakdown), kidney failure and cardiac arrest.

When hypohydration is extensive, attempts at rehydration usually are insufficient for body fluid and electrolyte homeostasis to be restored before competition. In wrestling, this is especially true between the official weigh-in and actual competition.

The practice of fluid deprivation (dehydration) has been condemned by all respected sports medicine authorities and organizations. To promote sound practices, student-athletes and coaches should be educated about the physiological and pathological consequences of hypohydration. The use of laxatives, emetics and diuretics should be prohibited. Similarly, the use of excessive food and fluid restriction, self-induced vomiting, vapor-impermeable suits (e.g., rubber or rubberized nylon), hot rooms, hot boxes and steam rooms should be prohibited. Excessive food restriction or self-induced vomiting may be symptoms of serious eating disorders (see guideline 2F).

Hypohydration is a potential health hazard that acts with poor nutrition and intense exercise to compromise health and athletic performance. The sensible alternative to dehydration weight loss involves: preseason determination of an acceptable (minimum) competitive weight, gradual weight loss to achieve the desired weight and maintenance of the weight over the course of the competitive season. Standard body composition procedures should be utilized to determine the appropriate competitive weight. Spot checks (body composition or dehydration) should be used to assure compliance with the weight standard during the season.

Student-athletes and coaches should be informed of the health consequences of dehydration, educated in proper weight-loss procedures, and subject to disciplinary action when approved rules are violated.

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NCAA®
GUIDE LINE 2e
Assessment of Body Composition

June 1991 • Revised August 1999

The NCAA Committee on Competitive Safeguards and Medical Aspects of Sports acknowledges the significant input of Dr. Dan Benardot, Georgia State University, who authored the revision of this guideline.

Athletic performance is, to a great degree, dependent on the ability of the athlete to overcome resistance and to sustain aerobic and/or anaerobic power. Both of these elements of performance have important training and nutritional components and are, to a large degree, influenced by the athlete's body composition. Coupled with the common perception of many athletes who compete in sports where appearance is a concern (swimming, diving, gymnastics, skating, etc.), attainment of an 'ideal' body composition often becomes a central theme of training.

Successful athletes achieve a body composition that is within a range associated with performance achievement in their specific sport. Each sport has different norms for the muscle and fat levels associated with a given height, and the athlete's natural genetic predisposition for a certain body composition may encourage them to participate in a particular sport or take a specific position within a sport. For instance, linemen on football teams have different responsibilities than receivers, and this difference is manifested in physiques that are also different.

Besides the aesthetic and performance reasons for wanting to achieve an optimal body composition, there may also be safety reasons. An athlete who is carrying excess weight may be more prone to injury when performing difficult skills than the athlete with a more optimal body composition. However, the means athletes often used in an attempt to achieve an optimal body composition may be counterproductive. Diets and excessive training often result in such a severe energy deficit that, while total weight may be reduced, the constituents of weight also change, commonly with a lower muscle mass and a relatively higher fat mass. The resulting higher body fat percentage and lower muscle mass inevitably results in a performance reduction that motivates the athlete to follow regimens that produce even greater energy deficits. This downward energy intake spiral may be the precursor to eating disorders that places the athlete at serious health risk. Therefore, while achieving an optimal body composition is useful for high-level athletic performance, the processes athletes often use to attain an optimal body composition may reduce athletic performance, may place them at a higher injury risk, and may increase health risks.

Purpose of Body Composition Assessment

The purpose of body composition assessment is to determine the athlete's distribution of lean (muscle) mass and fat mass. A high lean mass to fat mass ratio is often synonymous with a high strength to weight ratio, which is typically associated with athletic success. However, there is no single ideal body composition for all athletes in all sports. Each sport has a range of lean mass and fat mass associated with it, and each athlete in a sport has an individual range that is ideal for them. Athletes who try to achieve an arbitrary body composition that is not right for them are likely to place themselves at health risk and will not achieve the performance benefits they seek. Therefore, a key to body composition assessment is the establishment of an acceptable range of lean and fat mass for the individual athlete, and the monitoring of lean and fat mass over regular time intervals to assure a stability or growth of the lean

mass and a proportional maintenance or reduction of the fat mass. Importantly, there should be just as much attention given to changes in lean mass (both in weight of lean mass and proportion of lean mass) as the attention traditionally given to body fat percent.

In the absence of published standards for a sport, one strategy for determining if an athlete is within the body composition standards for the sport is to obtain a body fat percent value for each athlete in a team (using the same method of assessment), and obtaining an average and standard deviation for body fat percent for the team. Athletes who are within 1 standard deviation (i.e., a Z-score of ± 1) of the team mean should be considered within the range for the sport. Those greater than or less than ± 1 standard deviation should be evaluated to determine the appropriateness of their training schedule and nutrient intake. In addition, it is important for coaches and athletes to use functional performance measures in determining the appropriateness of an athlete's body composition. Athletes outside the normal range of body fat percent for the sport may have achieved an optimal body composition for their genetic makeup, and may have objective performance measures (i.e., such as jump height) that are well within the range of others on the team.

Body composition can be measured indirectly by several methods, including hydrostatic weighing, skinfold and girth measurements (applied to a nomogram or prediction equation), bioelectrical impedance analysis (BIA), dual-energy x-ray absorptiometry (DEXA), ultrasound, computerized tomography, magnetic-resonance imagery, isotope dilution, neutron-activation analysis, potassium-40 counting, and infrared interactance. The most common of the methods now used to assess body composition in athletes are skinfold measurements, DEXA, hydrostatic weighing, and BIA. While hydrostatic weighing and DEXA are considered by many to be the "gold standards" of the indirect measurement techniques, there are still questions regarding the validity of these techniques when applied to humans. Since skinfold-based prediction equations typically use hydrostatic weighing or DEXA as the criterion methods, results from skinfolds typically carry the prediction errors of the criterion methods plus the added measurement errors associated with obtaining skinfold values. BIA has become popular because of its non-invasiveness and speed of measurement, but results from this technique are influenced by hydration state. Since athletes have hydration states that are in constant flux, BIA results may be misleading unless strict hydration protocols are followed. In general, all of the commonly used techniques should be viewed as providing only estimates of body composition, and since these techniques use different theoretical assumptions in their prediction of body composition, values obtained from one technique should not be compared with values obtained from another technique.

Concerns with Body Composition Assessment

1. Using Weight as a Marker of Body Composition—While the collection of weight data is a necessary adjunct to body composition assessment, by itself weight may be a misleading value. For instance, young athletes have the expectation of growth and increasing weight, so gradual increases in weight should not be interpreted as a body composition problem. An athlete who has increased resistance training to improve strength may also have a higher weight, but since this increased weight is likely to

result from more muscle this should be viewed as a positive change. The important consideration for weight is that it can be (and often is) misused as a measure of body composition, and this misuse can detract from the purpose of body composition assessment.

2. Comparing Body Composition Values with Others Athletes—Athletes often compare body composition values with other athletes, but this comparison is not meaningful and it may drive an athlete to change body composition in a way that negatively impacts on both performance. and health. Health professionals involved in obtaining body composition data should be sensitive to the confidentiality of this information, and explain to each athlete that differences in height, age, and gender are likely to result in differences in body composition, without necessarily any differences in performance. Strategies for achieving this include:

- Obtaining body composition values with only 1 athlete at a time, to limit the chance that the data will be shared.
- Giving athletes information on body composition using phrases such as "within the desirable range" rather than a raw value, such as saying "your body fat level is 18%".
- Providing athletes with information on how they have changed between assessments, rather than offering the current value.
- Increasing the focus on muscle mass, and decreasing the focus on body fat.
- Using body composition values as a means of helping to explain changes in objectively measured performance outcomes.

3. Seeking an Arbitrarily Low Level of Body Fat—Most athletes would like their body fat level to be as low as possible. However, athletes often try to seek a body fat level that is arbitrarily low and this can increase the frequency of illness, increase the risk of injury, lengthen the time the athlete can return to training following an injury, reduce performance, and increase the risk of an eating disorder. Body composition values should be thought of as numbers on a continuum that are usual for a sport. If an athlete falls anywhere on that continuum it is likely that factors other than body composition (training, skills acquisition, etc.) will be the major predictors of performance success.

4. Excessive Frequency of Body Composition Assessment—Athletes who are assessed frequently (frequent weight and/or skinfolds taken) are fearful of the outcome, since the results are often (inappropriately) used punitively. Real changes in body composition occur slowly, so there is little need to assess athletes weekly, biweekly, or even monthly. Assessing body composition two to four times each year is an appropriate frequency to determine and monitor body composition change. In some isolated circumstances where an athlete has been injured or is suffering from a disease state, it is reasonable for a physician to recommend a more frequent assessment rate to control for changes in lean mass. Coaches who have traditionally obtained weight and/or body composition values weekly, biweekly, or monthly should shift their focus to a more frequent assessment of objective performance-related measures.

Summary

The assessment of body composition can be a useful tool in helping the athlete and coach understand the changes that are occurring as a result of training and nutritional factors. Health professionals involved in obtaining body composition data should focus on using the same technique with the same prediction

equations to derive valid comparative data over time. Care should be taken that body composition values are used constructively as part of the athlete's total training plan. Ideally, the emphasis should be on a periodic (quarterly) monitoring of the athlete's body composition to determine change of both the lean and fat mass. Many athletes are sensitive about body fat, so care should be taken to use body composition values in a way that enables their constructive use in the athlete's general training plan.

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NCAA® GUIDE LINE 2f

Eating Disorders

January 1986 • Revised June 1998

Many student-athletes face a difficult paradox in their training regimens. They are encouraged to eat to provide the necessary energy sources for performance, yet they often face self- or team-imposed weight restrictions. Emphasis on low body weight or low body fat may benefit performance only if the guidelines are realistic, the caloric intake is reasonable, and the diet is nutritionally well-balanced. The use of extreme weight-control measures can jeopardize the health of the student-athlete and possibly trigger behaviors associated with defined eating disorders.

There are four classes of eating disorders: anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder and eating disorders not otherwise classified, according to the 1994 statement of the American Psychiatric Association. These conditions share the criteria of attempting to control body weight to prevent weight gain. The fourth category was established because disordered eating could also include restrained eating, insufficient caloric intake or inappropriate behaviors such as bingeing and purging with less frequency or severity than required to meet the clinical diagnostic criteria of anorexia or bulimia yet may still have serious implications. Athletes frequently report binge eating, vomiting, use of laxatives and/or use of diuretics, all indications of disordered eating. Athletes should be concerned that they do not restrict energy intake below that needed to sustain the amount of training.

NCAA studies show that at least 40 percent of member institutions reported at least one case of anorexia or bulimia in their athletics programs. The number of athletes who do not fit the strict diagnostic criteria of anorexia and bulimia but still exhibit behaviors associated with disordered eating is even higher. Although these eating disorders are much more prevalent in women (approximately 90 percent of the reports in the NCAA studies were in women's sports), eating disorders also occur in men.

Eating disorders are often an expression of underlying emotional distress that may develop long before the individual becomes involved in athletics. It has been suggested that stress, whether it be from participating in athletics, striving for academic success, or pursuing social relationships, may trigger psychological problems, such as eating disorders, in susceptible individuals. Eating disorders can be triggered in such individuals by a single event or comments from a person important to the individual. In athletics performance, such triggering mechanisms may include offhand remarks about appearance or constant badgering about a student-athlete's body weight, body composition or body type.

Two serious eating disorders that may be experienced by student-athletes and their warning signs include:

Anorexia Nervosa—Self-imposed starvation in an obsessive effort to lose weight and to become thin.

Warning signs—Drastic loss in weight, a preoccupation with food, calories and weight, wearing baggy or layered clothing, relentless, excessive exercise, mood swings, and avoiding food-related social activities.

Bulimia Nervosa—Recurring binge eating usually followed by some method of purging such as vomiting, diuretic or laxative abuse, or intensive exercise.

Warning signs—Excessive concern about weight, bathroom visits after meals, depressive moods, strict dieting followed by eating binges, and increasing criticism of one's body.

It is important to note that the presence of one or two of these warning signs does not necessarily indicate the presence of an eating disorder, but may indicate a subclinical form of disordered eating. Absolute diagnosis should be done by appropriate professionals.

Anorexia and bulimia lead to semi-starvation and dehydration, which can result in loss of muscular

strength and endurance, decreased aerobic and anaerobic power, loss of coordination, impaired judgment and other complications that decrease performance and impair health. These symptoms may be readily apparent or they may not be evident for an extended period of time. Many student-athletes have performed successfully while experiencing an eating disorder. Therefore, diagnosis of this problem should not be based entirely on a decrease in athletics performance.

Coaches, athletic trainers and supervising physicians must be watchful for student-athletes who may be prone to eating disorders, particularly in sports in which appearance or body weight is a factor in performance. Decisions regarding weight loss should be based on the following recommendations to reduce the potential of an eating disorder:

1. Weight loss should be agreed upon by both the coach and the student-athlete with consultation with appropriate medical and nutritional personnel;

2. A responsible and realistic plan should be developed by all individuals involved; and

3. Weight-loss plans should be developed on an individual basis.

If a problem develops, thorough medical evaluation of the student-athlete suspected of an eating disorder is imperative. Once confirmed, treatment should emanate from professional guidance through medical, nutritional, psychological and/or psychiatric counseling. Because eating disorders are a growing problem with serious health consequences, the establishment of professionally guided support groups, access to personal counseling and an assistance hotline should be considered on every campus.

Education about eating disorders is a good preventive measure. In 1989, the athletics department at each member institution received the NCAA project "Nutrition and Eating Disorders in College Athletics." These materials, which included videotapes and written supplements, should be reviewed by athletics administrators, coaches, medical personnel and student-athletes. In addition, in 1992, the American College of Sports Medicine began development of informational materials on the female triad: disordered eating, amenorrhea and osteoporosis. These materials also are valuable resources for NCAA institutions.

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NCAA® GUIDE LINE 2g

Menstrual-Cycle Dysfunction

January 1986 • Revised June 1998

The NCAA Committee on Competitive Safeguards and Medical Aspects of Sports acknowledges the significant input of Dr. Anne Loucks, Ohio University, in the revision of this guideline.

In 80 percent of college-age women, the length of the menstrual cycle ranges from 25 to 35 days. Oligomenorrhea refers to a menstrual cycle that occurs inconsistently at longer intervals. Amenorrhea is the cessation of the menstrual cycle with ovulation occurring infrequently or not at all. A central issue involving amenorrhea is a lower level of circulating estrogen (hypoestrogenism), and its potential health consequences.

The prevalence of menstrual-cycle irregularities found in surveys depends on the definition of menstrual function used, but the prevelance of amenorrhea has been reported to be as high as 44 percent in athletic women. Although the exact relationship between physical activity and the menstrual cycle remains unclear, data suggest that excessive exercise and a lack of sufficient energy (caloric) intake can influence the incidence of menstrual dysfunction, with the hypotholamic-pituitary-gonadal (HPG) axis playing a key role. How this axis is altered by exercise training and diet is not clear, but recent experiments indicate that exercise has no effect on the HPG axis beyond the impact of its energy cost on energy availability.

There are two reasons to discuss the treatment of menstrual-cycle irregularities. One reason is infertility, and there appears to be no irreversible effects on the fertility of athletes with menstrual dysfunction. The second reason is skeletal demineralization, which occurs in hypoestrogenic women. Skeletal demineralization was first observed in athletic amenorrheic athletes in 1984. The spine is the primary skeletal site where demineralization occurs. Despite resumption of normal menses, the loss of bone mass resulting from the period of hypoestrogenemia is not completely reversible. Women with menstrual irregularities secondary to low levels of circulating estrogen are at risk for low peak bone mass, which has a critical influence on the potential for osteoporotic fractures later in life.

An increased incidence of stress fractures also has been observed in the long bones and feet of women with menstrual irregularities, but an exact causal relationship has yet to be defined.

The treatment goal for women with menstrual irregularities is the re-establishment of an appropriate hormonal environment for the maintenance of bone health. This can be achieved by the re-establishment of a regular menstrual cycle or by hormone replacement therapy. Additional research is necessary to develop a specific prognosis for exercise-induced menstrual dysfunction.

All student-athletes with menstrual irregularities should be seen by a physician. General guidelines should include:

1. Full medical evaluation, including an endocrine work-up;

2. Nutritional counseling with specific emphasis on:

   a. Total caloric intake versus energy expenditure;

   b. Calcium intake of 1,200 to 1,500 milligrams a day. At least two-thirds of this should be ingested as daily dietary intake and not solely in the form of a supplement;

3. Routine monitoring of the diet, menstrual function, weight-training schedule and exercise habits.

If this treatment scheme does not result in regular menstrual cycles, low-dose estrogen should be considered. This should be coupled with appropriate counseling on hormone replacement and

review of family history. Hormone-replacement therapy is thought to be important for the amenorrheic woman and the oligomenorrheic woman whose endocrine work-up reveals an estrogen deficiency.

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GUIDE LINE 2h
Blood-Borne Pathogens and Intercollegiate Athletics

April 1988 • Revised August 1999

Blood-borne pathogens are disease-causing microorganisms that can be potentially transmitted through blood contact. The blood-borne pathogens of concern include (but are not limited to) the hepatitis B virus (HBV) and the human immunodeficiency virus (HIV). Infections with these (HBV, HIV) viruses have increased throughout the last decade among all portions of the general population. These diseases have potential for catastrophic health consequences. Knowledge and awareness of appropriate preventive strategies are essential for all members of society, including student-athletes.

The particular blood-borne pathogens HBV and HIV are transmitted through sexual contact (heterosexual and homosexual), direct contact with infected blood or blood components and perinatally from mother to baby. The emphasis for the student-athlete and the athletics health-care team should be placed predominately on education and concern about these traditional routes of transmission from behaviors off the athletics field. Experts have concurred that the risk of transmission on the athletics field is minimal.

Hepatitis B Virus (HBV)

HBV is a blood-borne pathogen that can cause infection of the liver. Many of those infected will have no symptoms or a mild flu-like illness. One-third will have severe hepatitis, which will cause the death of one percent of that group. Approximately 300,000 cases of acute HBV infection occur in the United States every year, mostly in adults.

Five to 10 percent of acutely infected adults become chronically infected with the virus (HBV carriers). Currently in the United States there are approximately one million chronic carriers. Chronic complications of HBV infection include cirrhosis of the liver and liver cancer.

Individuals at the greatest risk for becoming infected include those practicing risky behaviors of having unprotected sexual intercourse or sharing intravenous (IV) needles in any form. There is also evidence that household contacts with chronic HBV carriers can lead to infection without having had sexual intercourse or sharing of IV needles. These rare instances probably occur when the virus is transmitted through unrecognized-wound or mucous-membrane exposure.

The incidence of HBV in student-athletes is presumably low, but those participating in risky behavior off the athletics field have an increased likelihood of infection (just as in the case of HIV). An effective vaccine to prevent HBV is available and recommended for all college students by the American College Health Association. Numerous other groups have recognized the potential benefits of universal vaccination of the entire adolescent and young-adult population.

HIV (AIDS Virus)

The Acquired Immunodeficiency Syndrome (AIDS) is caused by the human immunodeficiency virus (HIV), which infects cells of the immune system and other tissues, such as the brain. Some of those infected with HIV will remain asymptomatic for many years. Others will more rapidly develop manifestations of HIV disease (i.e., AIDS). Some experts believe virtually all persons infected with HIV eventually will develop AIDS and that AIDS is uniformly fatal. **In the United States, adolescents are at special risk for HIV infection. This age group is one of the fastest growing groups of new HIV infections. Approximately, 14% of all new HIV infections occur in persons aged between 12-24 years.** The risk of infection is increased by having unprotected sexual intercourse, as well as the sharing of IV needles in any form. Like HBV, there is evidence that suggests that HIV has been transmitted in household-contact

settings without sexual contact or IV needle sharing among those household contacts5,6. Similar to HBV, these rare instances probably occurred through unrecognized wound or mucous membrane exposure.

Comparison of HBV/HIV

Hepatitis B is a much more "sturdy/durable" virus than HIV and is much more concentrated in blood. HBV has a much more likely transmission with exposure to infected blood; particularly parenteral (needle-stick) exposure, but also exposure to open wounds and mucous membranes. There has been one well-documented case of transmission of HBV in the athletics setting, among sumo wrestlers in Japan. There are no validated cases of HIV transmission in the athletics setting. The risk of transmission for either HBV or HIV on the field is considered minimal; however, most experts agree that the specific epidemiologic and biologic characteristics of the HBV virus make it a realistic concern for transmission in sports with sustained close physical contact, such as wrestling. HBV is considered to have a potentially higher risk of transmission than HIV.

Testing of Student-Athletes

Routine mandatory testing of student-athletes for either HBV or HIV for participation purposes is not recommended. Individuals who desire voluntary testing based on personal reasons and risk factors, however, should be assisted in obtaining such services by appropriate campus or public-health officials.

Student-athletes who engage in high-risk behavior are encouraged to seek counseling and testing. Knowledge of one's HBV and HIV infection is helpful for a variety of reasons, including the availability of potentially effective therapy for asymptomatic patients, as well as modification of behavior, which can prevent transmission of the virus to others. Appropriate counseling regarding exercise and sports participation also can be accomplished.

Participation by the Student-Athlete with Hepatitis B (HBV) Infection

Individual's Health—In general, acute HBV should be viewed just as other viral infections. Decisions regarding ability to play are made according to clinical signs and symptoms, such as fatigue or fever. There is no evidence that intense, highly competitive training is a problem for the asymptomatic HBV carrier (acute or chronic) without evidence of organ impairment. Therefore, the simple presence of HBV infection does not mandate removal from play.

Disease Transmission—The student-athlete with either acute or chronic HBV infection presents very limited risk of disease transmission in most sports. However, the HBV carrier presents a more distinct transmission risk than the HIV carrier (see previous discussion of comparison of HBV to HIV) in sports with higher potential for blood exposure and sustained close body contact. Within the NCAA, wrestling is the sport that best fits this description.

The specific epidemiologic and biologic characteristics of hepatitis B virus form the basis for the following recommendation: If a student-athlete develops acute HBV illness, it is prudent to consider removal of the individual from combative, sustained close-contact sports (e.g., wrestling) until loss of infectivity is known. (The best marker for infectivity is the HBV antigen, which may persist up to 20 weeks in the acute stage). Student-athletes in such sports who develop chronic HBV infections (especially those who are e-antigen positive) should probably be removed from competition indefinitely, due to the small but realistic risk of transmitting HBV to other student-athletes.

Participation of the Student-Athlete with HIV

Individual's Health—In general, the decision to allow an HIV positive student-athlete to participate in intercollegiate athletics should be made on the basis of the individual's health status. If the student-athlete is asymptomatic and without evidence of deficiencies in immunologic function, then the presence of HIV infection in and of itself does not mandate removal from play.

The team physician must be knowledgeable in the issues surrounding the management of HIV-infected student-athletes. HIV must be recognized as a potentially chronic disease, frequently affording the affected individual many years of excellent health and productive life during its natural history. During this period of preserved health, the team physician may be involved in a series of complex issues surrounding the advisability of continued exercise and athletics competition.

The decision to advise continued athletics competition should involve the student-athlete, the student-athlete's personal physician and the team physician. Variables to be considered in reaching the decision include the student-athlete's current state of health and the status of his/her HIV infection, the nature and intensity of his/her training, and potential contribution of stress from athletics competition to deterioration of his/her health status.

There is no evidence that exercise and training of moderate intensity is harmful to the health of HIV-infected individuals. What little data that exists on the effects of intense training on the HIV-infected individual demonstrates no evidence of health risk. However, there is no data looking at the effects of long-term intense training and competition at an elite, highly competitive level on the health of the HIV-infected student-athlete.

Disease Transmission—Concerns of transmission in athletics revolve around exposure to contaminated blood through open wounds or mucous membranes. Precise risk of such transmission is impossible to calculate but epidemiologic and biologic evidence suggests that it is extremely low (see section on comparison of HBV/HIV). There have been no validated reports of transmission of HIV in the athletics setting.3,13 Therefore, there is no recommended restriction of student-athletes merely because they are infected with HIV.

Administrative Issues

The identity of individuals infected with a blood-borne pathogen must remain confidential. Only those persons in whom the infected student chooses to confide have a right to know about this aspect of the student's medical history. This confidentiality must be respected in every case and at all times by college officials, including coaches, unless the student chooses to make the fact public.

Athletics Health-Care Responsibilities

The following recommendations are designed to further minimize risk of blood-borne pathogen transmission in the context of athletics events and to provide treatment guidelines for caregivers. These are sometimes referred to as "universal precautions," but some additions and modifications

have been made as relevant to the athletics arena.

1. Pre-event preparation includes proper care for wounds, abrasions, cuts or weeping wounds that may serve as a source of bleeding or as a port of entry for blood-borne pathogens. These wounds should be covered with an occlusive dressing that will withstand the demands of competition. Likewise, care providers with healing wounds or dermatitis should have these areas adequately covered to prevent transmission to or from a participant. Student-athletes may be advised to wear more protective equipment on high-risk areas, such as elbows and hands.

2. The necessary equipment and/or supplies important for compliance with universal precautions should be available to caregivers. These supplies include appropriate gloves, disinfectant bleach, antiseptics, designated receptacles for soiled equipment and uniforms, bandages and/or dressings and a container for appropriate disposal of needles, syringes or scalpels.

3. When a student-athlete is bleeding, the bleeding must be stopped and the open wound covered with a dressing sturdy enough to withstand the demands of activity before the student-athlete may continue participation in practice or competition. Current NCAA policy mandates the immediate, aggressive treatment of open wounds or skin lesions that are deemed potential risks for transmission of disease. Participants with active bleeding should be removed from the event as soon as is practical. Return to play is determined by appropriate medical staff personnel. Any participant whose uniform is saturated with blood, regardless of the source, must have that uniform evaluated by appropriate medical personnel for potential infectivity and changed if necessary before return to participation.

4. During an event, early recognition of uncontrolled bleeding is the responsibility of officials, student-athletes, coaches and medical personnel. In particular, student-athletes should be aware of their responsibility to report a bleeding wound to the proper medical personnel.

5. Personnel managing an acute blood exposure must follow the guidelines for universal precaution. Sterile latex gloves should be worn for direct contact with blood or body fluids containing blood. Gloves should be changed after treating each individual participant and after glove removal, hands should be washed.

6. Any surface contaminated with spilled blood should be cleaned in accordance with the following procedures: With gloves on, the spill should be contained in as small an area as possible. After the blood is removed, the surface area of concern should be cleaned with an appropriate decontaminate.

7. Proper disposal procedures should be practiced to prevent injuries caused by needles, scalpels and other sharp instruments or devices.

8. After each practice or game, any equipment or uniforms soiled with blood should be handled and laundered in accordance with hygienic methods normally used for treatment of any soiled equipment or clothing before subsequent use. This includes provisions for bagging the soiled items in a manner to prevent secondary contamination of other items or personnel.

9. Finally, all personnel involved with sports should be trained in basic first aid and infection control, including the preventive measures outlined previously.

Member institutions should ensure that policies exist for orientation and education of all healthcare workers on the prevention and transmission of blood-borne

pathogens. Additionally, in 1992, the Occupational Safety and Health Administration (OSHA) developed a standard directed to eliminating or minimizing occupational exposure to blood-borne pathogens. Many of the recommendations included in this guideline are part of the standard. Each member institution should determine the applicability of the OSHA standard to its personnel and facilities.

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GUIDE LINE 2i
Nontherapeutic Drugs

July 1981 • Revised June 1998

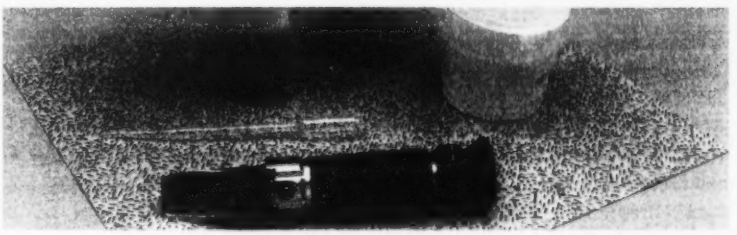
The NCAA and professional societies such as the American Medical Association (AMA) and the American College of Sports Medicine (ACSM) condemn the employment of nontherapeutic drugs by student-athletes. These include drugs that are taken in an effort to enhance athletic performance, as well as those drugs that are used recreationally by student-athletes. Examples include but are not limited to alcohol, amphetamines, anabolic-androgenic steroids, barbiturates, caffeine, cocaine, heroin, LSD, PCP, marijuana and all forms of tobacco. Use of such drugs is contrary to the rules and ethical principles of athletic competition.

The patterns of drug use and the specific drugs change frequently, and it is incumbent upon NCAA member institutions to keep abreast of current trends. The NCAA conducts drug-use surveys of student-athletes in all sports and across all divisions. The results of these surveys are available to all member institutions and can be used to educate staff and plan educational and treatment programs for its student-athletes.

The NCAA maintains a banned-substance list and conducts drug testing at championship events, as well as year-round, random testing in some sports. Some NCAA member institutions have developed drug-testing programs to combat the use of nontherapeutic substances. Such programs should follow guidelines established by the NCAA Committee on Competitive Safeguards and Medical Aspects of Sports. While not all member institutions have enacted their own drug-testing programs, it is essential to have some type of drug-education program.

All athletic trainers should be familiar with the regulations regarding dispensing medications as listed in Guideline No. 1C.

All member institutions, their athletics staff and their student-athletes should be aware of current trends in drug use and abuse, as well as the current NCAA list of banned drug classes. It is incumbent upon NCAA member institutions to act as a positive influence in order to combat the use of drugs in sport and society.



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NCAA®
GUIDE LINE 2j
Nutritional Ergogenic Aids

January 1990 • Revised July 1997

Nutritional supplements are marketed to athletes to improve performance, recovery time required after a workout or to build muscles. Many athletes use nutritional supplements despite their having been been proven ineffective. In addition, such substances are expensive and may be harmful to health or performance.

It is well known that a high-carbohydrate diet is associated with improved performance and enhanced ability to train. The carbohydrate content of the diet should be 55-65 percent of total energy intake (about 5-10 gm/kg body weight). The lower end of the range should be ingested during regular training; the high-end during intense training. High-carbohydrate foods alone can provide the necessary amount of carbohydrate. Supplement powders should be used only if athletes have problems consuming the needed amount of carbohydrate in their diet because of the large volume of food they may need. Energy bars marketed for athletes can augment carbohydrate intake during intense training or provide a quick boost of energy.

Protein and amino acid supplements are popular with bodybuilders and strength-training athletes. Although protein is needed to repair and build muscles after strenuous training, most studies have shown that athletes ingest a sufficient amount without supplements. The recommended amount of protein in the diet should be 12-15 percent of total energy intake (about 1.4-1.6 gm/kg of body weight) for all types of athletes. Although selected amino acid supplements are purported to increase growth hormone, studies using manufacturer-recommended amounts have not found an increase in growth hormone and muscle mass. Ingesting high amounts of single amino acids is contraindicated because they can affect the absorption of other essential amino acids and produce nausea or impair both training and performance.

Other commonly advertised supplements are vitamins and minerals. Most scientific evidence shows that selected vitamins and minerals will not enhance performance. Some vitamins and minerals are marketed to athletes for other benefits. For example, the antioxidants, vitamin E, C and beta-carotene are used by many athletes because they believe that these antioxidants will protect them from the damaging effects of aerobic exercise. Although such exercise can cause muscle damage, studies have found that training will increase the body's natural antioxidant defense system so that megadoses of antioxidants may not be needed. The mineral chromium has been suggested to increase muscle mass and decrease fat, but studies have not substantiated this claim. Similarly, magnesium is purported, but not proven, to prevent cramps. To obtain necessary vitamins and minerals, athletes should eat a wide variety of foods because not all vitamins and minerals are found in every food.

Other substances naturally occurring in foods, such as carnitine, herbal extracts and special enzyme formulations do not provide any benefit to performance. The high-fat diet has received recent attention, but data showing that this diet will enhance performance are weak, plus there is concern that such a diet will negatively affect health. Creatine has been found in some laboratory studies to enhance short-term, high-intensity exercise capability, delay fatigue on repeated bouts of such exercise and increase strength. Several studies have contradicted these claims, and, moreover, the safety of creatine supplements has not been verified. Weight gains of one to three kg per week have been found in creatine users, but the cause is unclear.

A high-carbohydrate diet consisting of complex carbohydrates, five servings of fruits and vegetables a day, low-fat dairy products, adequate protein and whole grains is the optimal diet for peak performance. Many "high-tech" nutrition-

al supplements may seem to be effective at first, but this is likely a placebo effect — if athletes believe these substances will enhance performance, they may train harder or work more efficiently. Ultimately, most nutritional supplements are ineffective, costly and unnecessary.

Athletics departments and athletes also should be concerned about "nutritional" supplements from another perspective. Many compounds obtained from specialty "nutrition" stores and from mail-order businesses may not be subject to the strict regulations set by the United States Food and Drug Administration. Therefore, contents of many of these compounds are not represented accurately on the list of ingredients and may contain impurities or banned substances which may cause a student-athlete to test positive. Positive drug-test appeals based on the claim that the student-athletes did not know the substances they were taking contained banned drugs have not been successful.

Athletes depend on coaches and athletic trainers to supply them with accurate and sound information on sports nutrition and help them discern media hype from fact about supplements. Given the above information, athletics administrators should evaluate the appropriateness of athletics department staff distributing or endorsing "nutritional" supplements.

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NCAA®
GUIDE LINE 2k
The Use of Local Anesthetics in College Athletics

June 1992 • Revised June 1998

The use of local injectable anesthetics to treat sports-related injuries in college athletics is primarily left to the discretion of the individual treating physician, since there is little scientific research on the subject. This guideline provides basic recommendations for the use of these substances, which commonly include lidocaine (Xylocaine), one or two percent; bupivacaine (Marcaine), 0.25 to 0.50 percent; and mepivacaine (Carbocaine), three percent. The following recommendations do not include the use of corticosteroids.

It is recommended that:

1. These agents should be administered only by a qualified clinician who is licensed to perform this procedure and who is familiar with these agents' actions, reactions, interactions and complications. The treating clinician should be well aware of the quantity of these agents that can be safely injected.

2. These agents should only be administered in facilities equipped to handle any allergic reaction including a cardiopulmonary emergency that may follow their use.

3. These agents should only be administered when medically justified, when the risk of administration is fully explained to the patient, when the use is not harmful to continued athletics activity and when there is no enhancement of a risk of injury.

The following procedures are not recommended:

1. The use of local anesthetic injections if they jeopardize the ability of the student-athlete to protect himself or herself from injury.

2. The administration of these drugs by anyone other than a qualified clinician licensed to perform this procedure.

3. The use of these drugs in combination with epinephrine or other vasoconstrictor agents in fingers, toes, earlobes, and other areas where a decrease in circulation, even if only temporary, could result in significant harm.

NCAA®
GUIDE LINE 21

The Use of Injectable Corticosteroids in Sports Injuries

June 1992 • Revised June 1998

Corticosteroids, alone or in combination with local anesthetics, have been used for many years to treat certain sports-related injuries. This guideline is an attempt to identify specific circumstances in which corticosteroids may be appropriate and also to remind both physicians and student-athletes of the inherent dangers associated with their use.

The most common reason for the use of corticosteroids in athletics is the treatment of chronic overuse syndromes such as bursitis, tenosynovitis, and muscle origin pain (for example, lateral epicondylitis). They have also been used to try to prevent redevelopment of a ganglion, and to reduce keloid scar formation. Rarely is it appropriate to treat acute syndromes such as acromio-clavicular (AC) joint separations or hip pointers with a corticosteroid.

There is still much to be learned about the effects of intra-articular, intraligamentous or intratendinous injection of corticosteroids. Researchers have noted reduced synthesis of articular cartilage after corticosteroid administration in both animals and human models. However, a causal relationship between the intra-articular corticosteroid and degeneration of articular cartilage has not been established. Research also has shown that a single intraligamentous or multiple intra-articular injections have the potential to cause significant and long-lasting deterioration in the mechanical properties of ligaments and collagenous tissues in animal models. Finally, studies have shown significant degenerative changes in active animal tendons treated with a corticosteroid as early as 48 hours after injection.

This research provides the basis for the following recommendations regarding the administration of corticosteroids in college athletics.

It is recommended that:

1. Injectable corticosteroids should be administered only after more conservative treatments, including nonsteroidal anti-inflammatory

agents, rest, ice, ultrasound and various treatment modalities, have been exhausted.

2. Only those physicians who are knowledgeable about the chemical makeup, dosage, onset of action, duration and potential toxicity of these agents should administer corticosteroids.

3. These agents should be administered only in facilities which are equipped to deal with allergic reactions including cardiopulmonary emergencies.

4. Repeated corticosteroid injections at a specific site should be done only after the consequences and benefits of the injections have been thoroughly evaluated.

5. Corticosteroid injections only should be done if a therapeutic effect is deemed possible and the student-athlete is not subject to either short- or long-term significant risk.

The following procedures are not recommended:

1. Intra-articular injections, particularly in major weight-bearing joints. Intra-articular injections have a potential softening effect on articular cartilage.

2. Intratendinous injections, since such injections have been associated with an increased risk of rupture.

3. Administration of injected corticosteroids immediately before a competition.

4. Administration of corticosteroids in acute trauma.

5. Administration of corticosteroids in infection.

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GUIDE LINE 2m
Cold Stress

June 1994 • Revised August 1999

Cold exposure can be uncomfortable, impair performance and even become life-threatening. Conditions created by cold exposure include wind chill, frostbite and hypothermia. Wind chill can make activity uncomfortable and can impair performance when muscle temperature declines. Frostbite is the freezing of superficial tissues, usually of the face, ears, fingers and toes. Hypothermia, a significant drop in body temperature, occurs with rapid cooling, exhaustion and energy depletion. The resulting failure of the temperature-regulating mechanisms constitutes a medical emergency.

Hypothermia frequently occurs at temperatures above freezing. A wet and windy 30-50 degree exposure may be as serious as a subzero exposure. As the wind chill chart indicates, wind speed interacts with ambient temperature to significantly increase body cooling. When the body and clothing are wet (whether from sweat, rain, or snow or immersion), the cooling is even more pronounced due to evaporation of the water held close to the skin by wet clothing.

Cold exposure affects many body systems. The combination of cold air and the deep breathing of exercise can trigger an asthma attack (bronchospasm). Cold air is not dangerous to lung tissue, but it can cause coughing, chest tightness and discomfort, such as a burning sensation in the throat and nasal passages.

Physiological factors such as strength, power, endurance and aerobic capacity are reduced by a drop in muscle temperature or body core temperature. Musculoskeletal injuries may increase when exercising vigorously in the cold, especially in the absence of adequate warm-up.

Early recognition of cold stress is important. Shivering, a means for the body to generate heat, serves as an early warning sign. Excessive shivering contributes to fatigue and makes performance of motor skills more difficult. Other signs include numbness and pain in fingers and toes or a burning sensation of the ears, nose or exposed flesh. As cold exposure continues the core temperature drops. When the cold reaches the brain, a victim may exhibit sluggishness, poor judgment and may appear disoriented. Speech becomes slow and slurred, and movements become clumsy. The victim wants to lie down and rest. This is a medical emergency. Transport as soon as possible. First aid involves getting the victim warm and dry and, if possible, hydrated with a warm beverage.

Prevention of cold stress is primarily a matter of dressing properly to control the climate next to the skin. Inadequate energy and fluid intake can significantly decrease cold tolerance. To prevent cold problems, student-athletes should be instructed as follows:

Clothing

Dress in layers and try to stay dry. Layers can be added or removed depending on temperature, activity and wind chill. Begin with a wicking fabric next to the skin. Add lightweight pile or wool layers for warmth and use a windblock garment to avoid wind chill. Because heat loss from the head and neck may be as much as 50 percent of total heat loss, the head should be covered during cold stress conditions. Hand covering should be worn as needed. Mittens are warmer than gloves.

Moisture, whether from perspiration or precipitation significantly increases body heat loss. Keep dry by wearing a wicking fabric next to the body, hands and feet. Polypropylene or wool wick moisture away from the skin and retain insulating properties when

wet. Cotton is a poor choice for winter wear since it holds moisture and loses insulating properties when wet.

Energy/Hydration

Maintain energy levels via use of meals, energy snacks and carbohydrate/electrolyte sports drinks. Negative energy balance increases the susceptibility to hypothermia. Stay hydrated, since dehydration affects the body's ability to regulate temperature and increases the risk of frostbite. Fluids are as important in the cold as in the heat. Avoid alcohol, caffeine, nicotine and other drugs that cause water loss, vasodilatation or vasoconstriction of skin vessels.

Fatigue/Exhaustion

Fatigue and exhaustion deplete energy reserves. Exertional fatigue and exhaustion increase the susceptibility to hypothermia, as does sleep loss.

Warm Up

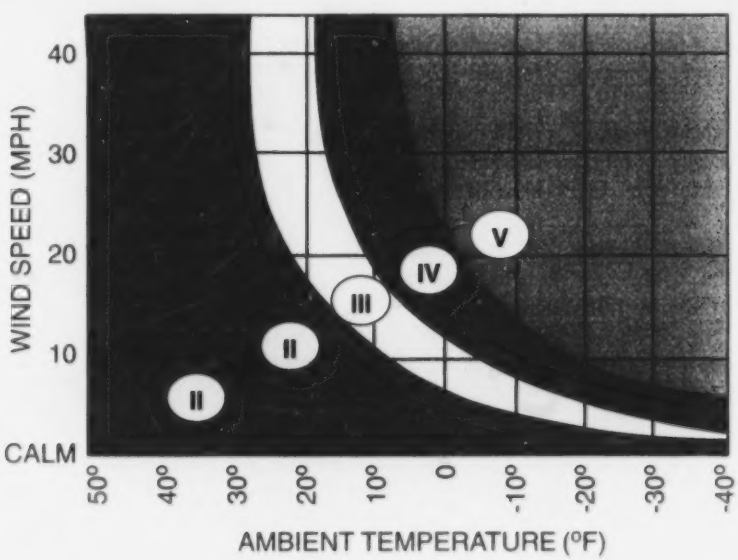
Warm up thoroughly, and keep warm throughout the practice or competition to prevent a drop in muscle or body temperature. Time the warm-up to lead almost immediately to competition. After competition add clothing to avoid rapid cooling. Warm extremely cold air with a mask or scarf to prevent bronchospasm.

Partner

Never train alone. An injury such as a sprained ankle can become life threatening when it occurs during a cold-weather workout on an isolated trail.

Avoidance of cold injury is a matter of recognizing the potential for cold stress and dressing appropriately. While there is considerable variation in cold tolerance, repeated exposure increases tolerance. Adequate energy, hydration and warm-up will minimize problems, as will avoidance of fatigue. Training with a partner helps to insure early recognition of dangerous conditions and problems. Considerations for canceling a practice or event should include specific environmental conditions, the experience and cold tolerance of the student-athletes and the factors associated with cold stress.

Cold Stress



I Comfort with normal precautions.
II Very cold, travel becomes uncomfortable on overcast days.
III Bitterly cold, travel becomes uncomfortable even on clear sunny days.
IV Freezing of human flesh begins, depending upon degree of activity, amount of solar radiation, and character of skin and circulation. Travel and life in temporary shelter becomes disagreeable.
V Survival efforts are required. Exposed flesh will freeze in less than one minute.

From: Textbook of Environmental Physiology, G.E. Folk Jr., 2nd Ed. Lea and Febiger, 1974, p. 143.

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NCAA®
GUIDE LINE 2n
"Burners" (Brachial Plexus Injuries)

June 1994 • Revised August 1999

"Burners" or "stingers" are so named because the injuries can cause a sudden burning pain and numbness along the forearm and hand. The more formal medical terminology is transient brachial plexopathy or an injury to the brachial plexus. A brachial plexus injury may also involve injury to a cervical root. An injury of the cord itself is more serious and frequently does not fall under this category of injury, although it shares certain symptoms; therefore, cord injuries should be ruled out when diagnosing burners.

The majority of burners occur in football. Such injuries have been reported in 52 percent of college football players during a single season. As many as 70 percent of college football players have experienced burners. Burners also can occur in a variety of other sports, including basketball, ice hockey, wrestling and some field events in track.

Mechanism

The most common mechanism for burners is head movement away from the shoulder either from a hit to the head or downward traction of the shoulder. This can stretch the nerve roots on the side receiving the blow (traction), or compress those on the opposite side. Contact to the side of the neck may cause a contusion to the brachial plexus, resulting in a burner symptom. Faulty technique often causes a brachial plexus injury, particularly with blocking and tackling in football. Teaching the proper techniques is essential for prevention. Coaches, parents and student-athletes should be warned about poor techniques and the appropriate corrections should be made

Symptoms and Severity

Student-athletes who suffer burners will be unable to move the affected arm from their side and will complain of burning pain, and potentially, numbness traveling from the injured side of the neck through the shoulder down the arm and forehand, and sometimes into the hand. Weakness may be present in the muscles of the shoulder, elbow and hand.

Brachial plexus injuries can be classified into three categories. The mildest form (Grade 1) are neuropraxic injuries that involve demyelination of the axon sheath without intrinsic axonal disruption. Compete recovery typically occurs in a few seconds to days. Grade 1 injuries are the most common in athletics. Grade 2 injuries involve axonotmesis or disruption of the axon and myelin sheath with preservation of the epineurium, perineurium, and endoneurium, which can serve as the conduit for the regenerating axon as it regrows at a 1-7mm per day. Weakness can last for weeks but full recovery typically occurs. Grade 3 injuries, neurotmesis or complete nerve transections fortunately are rare in athletics as surgical repair of the nerve is required and complete recovery may not occur.

A classification such as this has more meaning with regard to anticipated recovery of function than a grading on the severity of symptoms at the time of initial injury.

Treatment and Return to Play

Burner and stingers typically result in symptoms that are sensory in nature frequently involving the C5 and C6 dermatomes. All athletes sustaining burners should be removed from competition and examined thoroughly for injury to the cervical spine and shoulder. All cervical roots should be assessed for motor and sensory function. If symptoms clear within seconds to several minutes and are not associated with any neck pain, limitation of neck movement or signs

of shoulder subluxation or dislocation, the athlete can safely return to competition. It is important to re-examine the athlete after the game and for a few successive days to detect any reoccurrence of weakness or alteration in sensory exam.

If sensory complaints or weakness persists for greater than a few minutes, a full medical evaluation with radiographs and consideration for a MRI should be done to rule out cervical disk or other compressive pathology. If symptoms persist for greater than 2 to 3 weeks, an EMG may be helpful in assessing the degree and extent of injury. The EMG should not be used for return to play criteria, however, as EMG changes may persist for several years although symptoms have resolved. Shoulder injuries (acromioclavicular separation, shoulder subluxation or dislocation, and clavicular fractures) should be considered in the differential diagnosis of the athlete with transient orprolonged neurologic symptoms of the upper extremity. Any injured athlete who presents with specific cervical-point tenderness, neck stiffness, bony deformity, fear of moving his/her head, and/or complains of a heavy head should be immobilized on a spine board as one would a cervical spine fracture and transported to a medical facility for a more thorough evaluation.

Bilateral symptoms indicate that the cord itself has been traumatized and may suggested transient quadriplegia and athletes with such symptoms or signs should also be immobilized and transported to a medical facility for a more thorough evaluation.

All athletes sustaining burners or stingers should begin neck and trunk strengthening exercises. The fit of shoulder pads should be rechecked and consideration of other protective equipment such as lifters, neck rolls, and/or collars should be given. The athlete's tackling techniques should be reviewed.

Burner assessment should be part of the student-athletes' preseason physical and mental history (see handbook Guideline No. 1B) so that these "at risk" athletes can be instructed in a prevention exercise program and also be provided with proper protective equipment.

Recurrent Burners

Recurrent burners may be common; 87 percent of athletes in one study had experienced more than one. Medical personnel should pay special attention to this condition. Although rare, risk of permanent nerve injury exists for those with recurrent burners. Therefore, participants should report every occurrence to their athletic trainers or team physician. Any player with persistent pain, burning, numbness and/or weakness (lasting longer than two minutes) or recurrent symptoms should be kept out of competition and sent for physician evaluation.

A Word of Caution

Management of the student-athlete with recurrent burners can be difficult. No clear guidelines concerning return to play exist. Although some risk of permanent nerve injury exists, review of the literature shows this risk to be small. The most important concern for student-athletes with recurrent burners is to stress the importance of reporting all symptoms to the attending medical personnel so that a thorough physical examination with particular attention to strength and sensory changes can be obtained. Any worsening of symptoms should provoke a more thorough investigation of the neck and spinal cord region.

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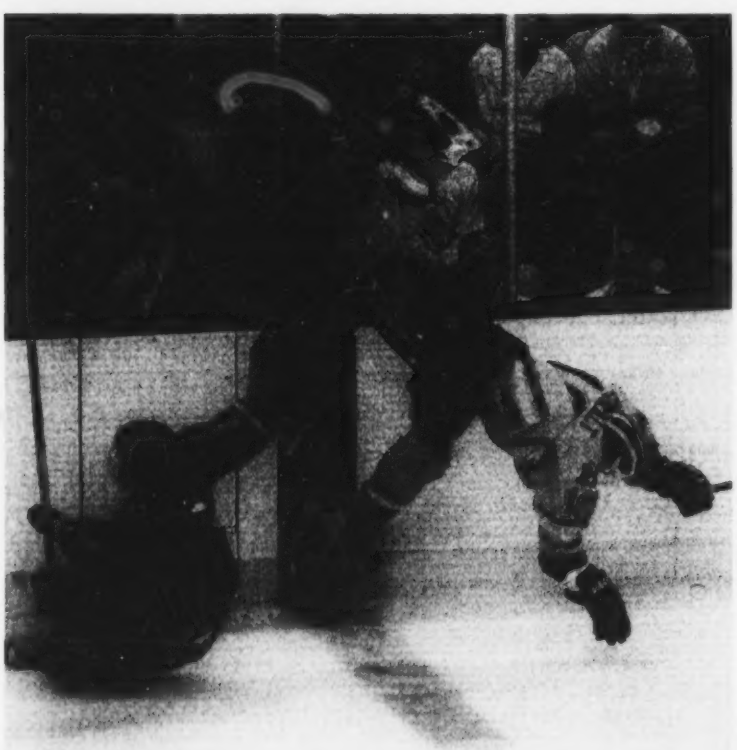
NCAA®
GUIDE LINE 2o
Concussion and Second-Impact Syndrome

June 1994 • Revised July 1997

Concussion and the resulting potential complications, such as second-impact syndrome, are potentially life-threatening situations that student-athletes may suffer as a result of their athletics participation. While concussions may occur in almost any contact activity, data from the NCAA Injury Surveillance System (ISS) for the period 1994-96 estimated that more than 1,500 concussions occur annually in college football. Nine of every 10 head injuries in the sport are reported as concussions. Since no head injury should be considered trivial, proper evaluation and sound decision-making are imperative before the sports medicine profession permits the student-athlete to return to activity.

The definition of concussion is a post-traumatic impairment of neural status. While loss of consciousness and amnesia have been viewed as the primary components of this injury and have formed the basis for most grading scales, some of the mild concussions, the so-called "bell rung" or "ding," with no resulting loss of consciousness or post-traumatic amnesia, may go unrecognized by coaches, athletic trainers, fellow players or team physicians. The symptoms of concussion (Table 1) vary, depending on the degree and extent of injury. **A student-athlete rendered unconscious for any period of time should not be permitted to return to the practice or game in which the head injury occurred. In addition, no student-athlete should be allowed to return to athletics activity while symptomatic.** Prolonged unconsciousness and neurologic abnormalities suggesting intracranial pathology may require urgent neurosurgical consultation or transfer to a trauma center. If there are any questions as to the severity of past head trauma, or if the trauma required intracranial surgery, clearance of the student-athlete should be deferred until further records are obtained or neurosurgical evaluation is performed.



Several grading scales have been proposed to characterize the degrees, potential severity and return-to-play criteria of

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concussion.[6,7,9,12,13,15] Unfortunately, these categorizations vary and are not universally accepted. Based on the current lack of consensus among the medical community on management of concussions, the NCAA does not endorse any specific concussion grading scale or return-to-play criteria. Although the grading scales and return-to-play criteria currently in the literature may assist in the clinical decision-making for the student-athlete who has suffered a concussion, these grading scales and return-to-play criteria should not be substituted for the clinical judgment of the examining physician.

Post-Concussion Syndrome

After a head injury, the student-athlete may report multiple symptoms (Table 1). While these symptoms usually are short-lived and resolve spontaneously, some individuals may have persistent symptoms after a concussion. Characteristics of post-concussion syndrome are symptoms such as impaired memory and concentration, persistent headache, fatigue, mood and sleep disturbances and dizziness. The student-athlete with symptoms of post-concussion syndrome should not be considered for return to physical activity until resolution of symptoms occurs. Diagnostic studies such as MRI or CT imaging and/or neuropsychological testing may be indicated and referral to a neurologist or neurosurgeon should be considered.

Multiple Concussions

The athlete who suffers one concussion may be at greater risk for another. Evidence of cognitive impairment and neuroanatomical damage has been reported in some individuals. The number and degree of concussions necessary for permanent impairment is unknown. Return-to-play decisions should be made on an individual basis after the student-athlete has full recovery of neuronal function and can be informed of the potential risks for subsequent concussion and possible complications. As with all concussions, careful review of the mechanism of injury and appropriate changes in the environment that can be made to reduce the likelihood of subsequent concussion should be undertaken.

Second-Impact Syndrome

The medical staff needs to be aware of the rare but often fatal consequence of the second-impact syndrome. This occurs when an individual sustains a second, often minor trauma to the head before the initial symptoms of the first head injury have resolved. The resulting loss of autoregulation of the brain's blood supply could result in vascular engorgement and herniation of the lower brain, causing death. There is a high mortality rate associated with second-impact syndrome.

Table 1
Symptoms of Concussion

Headache	Irritability
Confusion/Disorientation	Hyperexcitability
Tinnitus	Loss of Consciousness
Dizziness	Unsteadiness
Nausea	Visual Disturbance
Amnesia	Concentration Difficulty
Post-traumatic	
Retrograde	

Summary

The attending medical staff should not allow a player to resume participation in physical activity while the injured student-athlete is recovering from his/her post-concussive symptoms. All individuals involved in sports, including coaches, athletic trainers, team physicians, student-athletes and parents should be educated in the symptoms of concussion and the need for medical attention in the event of such an injury. With regard to injury prevention in football, coaches, athletic trainers and medical personnel should strive to help educate players in proper tackling techniques so that these injuries can be minimized. Neck-strengthening exercises are important in preventing rapid acceleration/deceleration injuries that can occur without a direct blow to the head. In addition, proper equipment and maintenance, including adequate helmet fit (inflation of air bladder in helmet) and shock-absorbing mouthpieces, can be beneficial in preventing concussions. All medical personnel need to be reminded that they should suspect all unconscious student-athletes to have suffered a cervical spine injury until proven otherwise. Special care to the cervical spine should always be used in transporting an unconscious player.

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SPORTS SCIENCES

3 SPECIAL POPULATIONS

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NCAA®
GUIDE LINE 3a
Participation by the Impaired Student-Athlete

January 1976 • Revised August 1999

Although descriptive terms such as impaired, disabled, handicapped and physically challenged are commonly found in current medical and legal literature, uniform definitions are difficult. The World Health Organization has defined "impaired" as "any loss or abnormality of psychological, physiological or anatomical structure or function." This definition will be accepted for the purposes of this guideline. As such, "impaired student-athletes" may include, but not necessarily be limited to:

1. Those confined to a wheelchair;

2. Those who are deaf, blind or missing a limb;

3. Those who have only one of a set of paired organs;

4. Those with a severe chronic illness;

5. Those with a severe reduction in normal physiologic function; and

6. Those who may have behavioral, emotional or psychological disorder that substantially limits a major life activity.

The NCAA, in accordance with major medical organizations and The Americans With Disabilities Act (effective July 1992), encourage participation of impaired persons in sports and physical activities to the full extent of their abilitys in the appropriate setting. It is imperative that physicians involved with impaired athletes need to accurately assess their medical needs and specific limitations so that medical precautions will be appropriate and needless restrictions will be avoided. Courts have generally upheld the right of qualified impaired athletes to participate so long as their participation does not violate the general medical standard of care or jeopardize the safety of others.

In support of the intent of these statements, the NCAA recognizes the right of impaired individuals to an equal opportunity to participate in high-quality sport or recreational programs. These individuals should be eligible for intercollegiate programs if they qualify for a team without any lowering of standards for achievement, attendance or completion of required tasks, and if they do not put others at risk.

Medical exclusion of an impaired student from an athletics program should occur only when the impairment presents a significant risk of substantial harm to the health or safety of the individual and/or other participants that cannot be eliminated or reduced by reasonable accommodations. When impaired students who are not qualified to participate in existing programs are identified, every means should be explored by member institutions to provide suitable sport and recreational programs in the most appropriate, integrated settings possible to meet their needs.

Participation Considerations

Before allowing any impaired student-athlete to participate in an athletics program, it is recommended that an institution require joint approval from the physician most familiar with the impaired student-athlete's condition, the team physician, and an appropriate official of the institution, plus the parent(s). In all cases, the decision to participate should include:

1. Available published information on the risks of participation;

2. The current health status of the student-athlete;

3. The sport and position played;

4. Availability of acceptable pro-

tective equipment or measures;

5. The ability of the athlete (and, in the case of a minor, the parents) to understand the risks.

Organ Absence or Non-function

In the specific instance in which the absence or nonfunction of one of a set of paired organs constitutes the specific impairment, the following specific issues need to be addressed with the student-athlete and his/her parents (in the case of a minor). This discussion, and the subsequent process by which the decision for or against participation is made, should take into account the following factors:

1. The quality and function of the remaining organ;

2. The probability of injury to the remaining organ, and

3. The availability of current protective equipment and the likely effectiveness of such equipment to prevent injury to the remaining organ.

Medical Release

When the decision is made to allow the impaired student-athlete to compete, it is recommended that a properly executed document of understanding and a waiver/medical release concerning the ramifications of sports participation relative to the impairment should be executed. Participants in such a document should include all relevant parties (e.g., the student-athlete, parents/guardians in the case of a minor, the consulting physician, a representative of the institution's medical staff, a representative of the athletics department and legal counsel). Such statements are not a guarantee against legal action should an unfortunate circumstance occur, but serve to document the student-athlete's understanding of the student-athlete's medical condition and potential risks of participation and the institution's and medical staff's intentions and efforts on behalf of that student-athlete.

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NCAA®
GUIDE LINE 3b
Participation by the Pregnant Student-Athlete

January 1986 • Revised August 1999

Assessing the risk of strenuous physical activity in the pregnant student-athlete is difficult since there are few studies addressing this topic. Nevertheless, current knowledge indicates that women who exercise at submaximal levels during pregnancy have a reduced incidence of labor and delivery complications, restrict weight gain without compromising fetal growth, have a quicker postpartum recovery than their sedentary counterparts and are not a greater risk of spontaneous abortion. On the other hand, sustained maximal exercise may be harmful to the mother and fetus, possibly resulting in:

1.Elevated core body temperature that exceeds the teratogenic threshold;

2. a higher incidence of fetal-growth retardation and

3. increased risk of premature birth.

Based upon this information, many medical experts recommend that pregnant women avoid participating in competitive contact sports or activities that require a sustained maximum performance. Women who have medical conditions that place their pregnancies at high risk should avoid vigorous physical activity. Examples of these medical conditions include, but are not limited to diabetes, hypertension, obesity, cardiovascular disease, history of three or more spontaneous abortions and cervical defects that increase the risk of a spontaneous abortion or preterm labor.

The risks and benefits of athletics participation should be explained to the pregnant student-athlete. The athlete, her personal physician, the team physician, and the member institution should weigh the risks and benefits of the athlete's participation while pregnant. This discussion and the subsequent decision-making process as to whether or not to allow participation, should take into account the risk of injury to the student-athlete and her fetus.

If a decision is made to allow the pregnant student-athlete to compete, it is suggested that documentation outlining the athlete's medical condition, the potential risks of athletic participation during pregnancy and athlete's understanding of these risks be included in the athlete's medical records. Following delivery or pregnancy termination, medical clearance is required to ensure the student-athlete's safe return to athletics. (See Follow-up or Exit Examination section of the guideline "Medical Evaluations, Immunizations and Records").

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NCAA®
GUIDE LINE 3c
The Student-Athlete with Sickle Cell Trait

January 1975 • Revised June 1998

Sickle cell trait is not in itself a disease. It is a descriptive term for a hereditary condition in which an individual has one normal gene for hemoglobin (A) and one abnormal gene for hemoglobin (S), giving the genetic type (AS). Sickle cell trait condition (AS) is not the same as sickle cell anemia disease (SS), in which two abnormal genes are present. Approximately eight to 10 percent of the U.S. black population has sickle cell trait, while less than one percent exhibit sickle cell anemia. Sickle cell trait is found in nonblack athletes as well as black athletes, although, in a much lower frequency. It is present in athletes at all levels of competition, including professional and Olympic. Sickle cell trait is not a barrier to outstanding athletics performance.

In general, sickle cell trait is a benign condition that does not affect the longevity of the individual. Persons who carry only the sickle cell trait do not have the associated anemia. Two situations that have not been found to affect the morbidity, mortality or athletics performance of people with sickle cell trait are:

1. Hyposthenuria (inability to concentrate urine normally) and

2. Hematuria.

However, the sickle cell trait has been linked definitively to splenic infarction with cases apparently more frequent in nonblacks. This situation typically occurs at altitude (usually greater than 5,000 feet), although a case has been described near sea level. Signs and symptoms of a splenic infarction include sudden acute pain in the lower ribs, weakness and nausea. It appears that strenuous physical exertion after a recent arrival at altitude is a common theme. Although there are more than two million people in the United States with sickle cell trait, only a few cases of splenic infarction are reported each year.

It has been suggested that the sickle cell trait is linked to two other medical problems that may elicit health and performance concerns. These include:

1. Exercise-related rhabdomyolysis and

2. Exercise-associated sudden death.

Several anecdotal cases of exercise-related rhabdomyolysis (fatal and nonfatal) in athletes with sickle cell trait have been reported. However, exercise-related rhabdomyolysis also has been reported in nonsickle cell trait athletes. At this time, no direct causal evidence has been shown and the relationship is unclear.

There is a controversy in the medical literature concerning whether sickle cell trait increases the risk of exercise-associated sudden death. One study from a large population of recruits undergoing military basic training indicated a possible association of increased sudden unexplained deaths (heat injuries, rhabdomyolysis and sudden cardiac arrythmia) in black recruits with sickle cell trait. There have been no studies concerning athletes.

Acknowledging that no sports medicine body currently suggests any restrictions for the athlete with sickle cell trait, the NCAA Committee on Competitive Safeguards and Medical Aspects of Sports has determined that the following points be considered by athletics healthcare providers:

1. Routine screening for sickle cell trait is not recommended;

2. Team physicians and athletic trainers should familiarize themselves with the medical literature concerning sickle cell trait;

3. Serious medical problems associated with the sickle cell trait are rare even during athletics competition. No unwarranted restrictions or

limitations should be placed on the student-athlete with sickle cell trait;

4. If screening is done, it should be done on a voluntary basis with the informed consent of the student-athlete and should be offered to all student-athletes, since sickle cell trait is found in both black and nonblack individuals. If a test is positive, the student-athlete should be offered genetics counseling for concerns such as family planning, and an explanation of a possibly remote and unclear risk involved with physical exertion and altitude. This consultation should be documented in the student-athlete's medical record, and

5. All student-athletes, including those with known sickle cell trait, should be counseled to:

a. Avoid dehydration and acclimatize gradually to heat and humidity;

b. Condition carefully and gradually for several weeks before engaging in exhaustive exercise regimens;

c. Acclimate to altitude over an appropriate amount of time;

d. Refrain from extreme exercise during acute illness, especially one involving fever.

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SPORTS SCIENCES

4

EQUIPMENT

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GUIDE LINE 4a
Protective Equipment

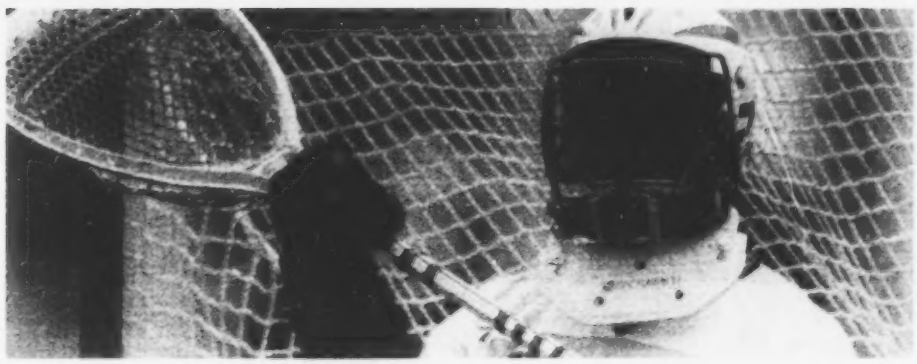
June 1983 • Revised June 1994

Rules governing mandatory equipment and equipment use vary by sport. Athletics personnel should be familiar with what equipment is mandatory by rule and what constitutes illegal equipment; how to wear mandatory equipment during the contest, and when to notify the coaching staff that the equipment has become illegal during competition. Athletics personnel involved in sports with established equipment standards should adhere to those standards.

The NOCSAE mark on a helmet or HECC seal on an ice hockey face mask indicates that the equipment has been tested by the manufacturer in accordance with NOCSAE or HECC test standards. By keeping a proper fit, by not modifying its design, and by reporting to the coach or equipment manager any need for its maintenance, the student-athlete also is complying with the purpose of the standard.

The following list of mandatory equipment and rules regarding protective equipment use is based on 1996-97 rules committee actions. The most updated information should be obtained from relevant NCAA sports committees.

Sport	Mandatory Protective Equipment*	Rules Governing Special Protective Equipment
1. Baseball	**1.** A double ear-flap protective helmet for batting and running bases. Helmets must carry the NOCSAE mark. **2.** All catchers must have a built-in or attachable throat guard on their masks. **3.** All catchers are required to wear a protective helmet when fielding their position.	



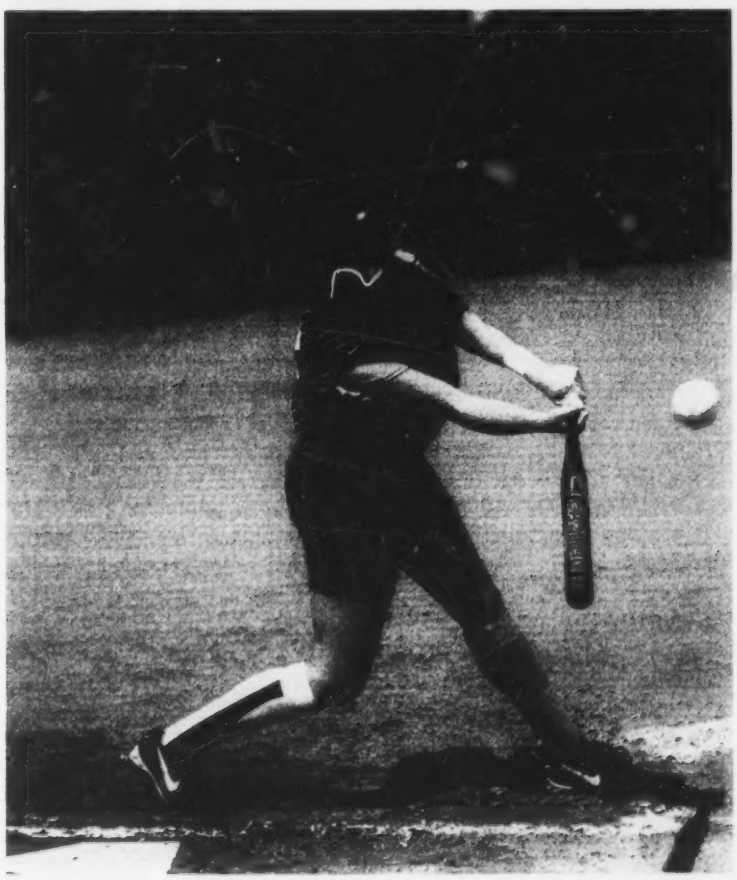
Sport	Mandatory Protective Equipment*	Rules Governing Special Protective Equipment
2. Men's and Women's Basketball	None	Elbow, hand, finger, wrist or forearm guards, casts or braces made of plaster, metal or any other nonpliable substance shall be prohibited. Pliable (soft) plastic may be used as protective covering for an injury. The prohibition of the use of hard-substance material does not apply to the upper arm, shoulder, thigh or lower leg if the material is padded so as not to create a hazard for other players. Equipment that could cut or cause an injury to another player is prohibited, without respect to whether the equipment is hard.
3. Men's and Women's Fencing	**1.** Masks with mesh cover **2.** Gloves **3.** Jacket or vest and metallic lames **4.** Ladies' chest protectors **5.** Underarm protector	
4. Field Hockey	**1.** The following equipment is permitted for use only by goalkeepers: body and throat protectors, pads, kickers, gauntlet gloves, "hard" headgear, face mask and elbow pads. **2.** Mouthguards for all players except goalkeepers. **3.** Throat protector and helmet for player designated as a "kicking back."	Players shall not wear anything that may be dangerous to other players. Players have the option of wearing soft headgear subject to game official approval.

Sport	Mandatory Protective Equipment*	Rules Governing Special Protective Equipment
5. Football	**1.** Soft kneepads at least ½-inch thick worn over the knees and covered by pants. No pads or protective equipment may be worn outside the pants. **2.** Face masks and helmets with a secured four-point chin strap. All players shall wear helmets that carry a warning label regarding the risk of injury and a manufacturer's or reconditioner's certification indicating satisfaction of NOCSAE test standards. **3.** Shoulder pads, hip pads with tailbone protectors and thigh guards. **4.** An intra-oral yellow or any other readily visible colored mouthpiece (not white) with FDA-approved base materials (FDCS) that covers all upper teeth.	Illegal equipment includes the following: **1.** Equipment worn by a player, including artificial limbs, that would endanger other players. **2.** Hard, abrasive or unyielding substances on the hand, wrist, forearm or elbow of any player, unless covered on all exterior sides and edges with closed-cell, slow-recovery foam padding no less than ½-inch thick or an alternate material of the same minimum thickness and similar physical properties. Hard or unyielding substances are permitted, if covered, only to protect an injury. Hand and arm protectors (covered casts or splints) are permitted only to protect a fracture or dislocation. **3.** Thigh guards of any hard substances, unless all surfaces are covered with material such as closed-cell vinyl foam that is at least ¼-inch thick on the outside surface and at least ⅜-inch thick on the inside surface and the overlaps of the edges; shinguards not covered on both sides and all edges with closed-cell, slow-recovery foam padding at least ½-inch thick, or an alternate material of the same minimum thickness having similar physical properties; and therapeutic or preventive knee braces, unless worn under the pants and entirely covered from direct external exposure.

Sport	Mandatory Protective Equipment*	Rules Governing Special Protective Equipment
5. Football (continued)		**4.** Projection of metal or other hard substance from a player's person or clothing.
6. Gymnastics	None	
7. Men's Ice Hockey	**1.** Helmet with chin straps securely fastened. It is recommended that the helmet meet HECC standards. **1.** An intra-oral mouthpiece that covers all the upper teeth. **3.** Face masks that have met the standards established by the HECC-ASTM F 513-89 Eye and Face Protective Equipment for Hockey Players Standard.	**1.** The use of pads or protectors made of metal or any other material likely to cause injury to a player is prohibited. **2.** The use of any protective equipment that is not injurious to the player wearing it or other players is recommended.
8. Women's Lacrosse	**1.** The goalkeeper must wear a face mask and/or helmet, a throat protector and a chest protector. **2.** All field players shall wear properly an intra-oral mouthpiece that covers all upper teeth.	Protective devices necessitated on genuine medical grounds must be approved by the umpires. Close-fitting gloves, nose guards, eye guards and soft headgear may be worn by all players. These devices must create no danger to other players.
9. Men's Lacrosse	**1.** Protective helmet that carries the NOCSAE mark, equipped with face mask and chin pad, with a cupped four-point chin strap (high-point hookup). **2.** Intra-oral mouthpiece that covers all the upper teeth and is yellow or any other highly visible color. **3.** Protective gloves. **4.** Throat protector and chest protector are required for the goalie.	**1.** A player shall not wear any equipment that, in the opinion of the official, endangers the individual or others. **2.** The special equipment worn by the goalkeeper shall not exceed standard equipment, which includes shinguards, chest protectors and throat protectors.

Sport	Mandatory Protective Equipment*	Rules Governing Special Protective Equipment
10. Rifle	Shooters and range personnel in the immediate vicinity of the range required to wear hearing protection during smallbore. Shooters urged to wear eye protection.	
11. Men's and Women's Soccer	Shinguards.	**1.** A player shall not wear anything that is dangerous to another player. **2.** The use of any hard or dangerous head, face or body protective equipment is illegal. **3.** Knee braces are permissible provided no metal is exposed. **4.** Casts are permitted if covered and not considered dangerous.
12. Men's and Women's Skiing	Giant slalom racers must wear helmets designed for ski racing.	
13. Women's Softball	**1.** Chest protectors and masks with throat protectors must be worn by catchers. **2.** A double ear-flap protective helmet for batting and base running. Helmets must carry the NOCSAE mark.	**1.** Plaster or other hard substances may not be worn. **2.** Any exposed metal is prohibited unless covered by soft material and taped.
14. Men's and Women's Swimming and Diving	None	
15. Men's and Women's Track	None	No taping of any part of the hands or fingers will be permitted in the hammer, discus, javelin and 35-pound weight throws unless there is an injury, cut or wound that will be protected by tape.

Sport	Mandatory Protective Equipment*	Rules Governing Special Protective Equipment
16. Water Polo	Cap with protective ear guards.	
17. Wrestling	Protective ear guard.	**1.** Anything that does not allow normal movement of the joints and prevents one's opponent from applying normal holds shall be barred. **2.** Any legal device that is hard and abrasive must be covered and padded. Loose pads are prohibited. It is recommended that all wrestlers wear a protective mouth guard.



*All mandatory equipment must be manufactured professionally.

NCAA®
GUIDE LINE 4b
Eye Safety in Sports

January 1975 • Revised August 1999

Eye injuries in sports are relatively frequent, sometimes catastrophic, and almost completely preventable with the use of appropriate protective devices.

Eye wear in sports encompasses both corrective lenses to achieve visual acuity and protective lenses to reduce the risk of ocular injury.

The following definitions are listed to aid in the discussion of this topic.

A. Sports Eye Protector—a specially designed, fracture-resistant unit that serves as eye protection only and that complies with the American Society for Testing and Materials (ASTM) Standard F803-83 (Eye Protectors for Use by Players of Racquet Sports). The unit comes with or without lenses and is capable of being held securely in place. Some forms can be worn over regular glasses.

B. Sports Spectacles—a plastic (or reinforced plastic) eyeglasses unit, with nonadjusting nose pads and lens grooves constructed to include a posterior retaining lip.

C. Sports Goggles—as in definition B (goggle styling, as in downhill skiing).

D. Industrial Safety Spectacles and Goggles—ANSI Z87.1 (1989) is the standard that describes acceptable eye-protection units for use in the American industrial community.

E. Plastic Lenses—Polycarbonate plastic or CR-39.

F. One-Eyed Athlete—Participants whose best corrected vision in their weaker eye is 20:80 or worse.

Corrective Lenses

Approximately one-third of all persons participating in sports require corrective lenses to achieve the visual acuity necessary for proper and safe execution of their particular sports activity. There are eye injuries related both to the absence of proper visual correction, and the use of corrective lenses and frames that do not meet proper sports-safety standards.

Contact lenses are a popular form of corrective eye wear for sports. Advantages include cosmetic considerations, improved peripheral vision, and correction of certain visual irregularities. Nuisances and limitations accompany contact lens use. These include accidental displacement of contact lenses (which can impair vision) during sports activity, loss of contact lenses during competition, and readjustments of lenses during sports play. Having a duplicate set of lenses on hand is often prudent for the student-athlete. Contact lenses are not capable of protecting the eye from direct blows. Student-athletes who wear contact lenses for corrective vision may want to accompany this by wearing sports-safety glasses for ocular protection. Student-athletes who choose to engage in sports while wearing contact lenses should adhere faithfully to the guidelines and recommendations of their eye-care specialist.

Protective Lenses

Eye protectors are highly recommended for those engaging in racquet sports such as squash, handball, racquetball and paddle ball. Protective lenses also should be worn for all sports that have a projectile object (ball/stick) whose size and/or speed could potentially cause ocular damage. If no ASTM standard has been developed for a sport, equipment from a comparable sport with an ASTM standard should be used. Certified head and eye protection should be developed for each relevant activity. Eye-protection devices are designed to reduce significantly the risk of injury, but can never provide a guarantee against such injuries.

Guidelines:

1. All participants in collision-contact sports who use corrective lenses (including contact lenses) in their sports activity should have eye protection conforming to definitions A through D.

2. All participants in racquet sports such as squash, handball, racquetball and paddleball should have eye protection with lenses conforming to ASTM Standard F803-83 (definition A). This protector should be of the closed type, as it has been shown that the open (without lenses) models are not protective.

3. All participants in any sport that uses a projectile of a size, consistency or speed capable of causing ocular injuries (i.e., lacrosse, baseball, softball, tennis) should consider eye protection as described in item No. 2.

4. When external lenses (i.e., all other than contact lenses), either corrective or noncorrective, are used for eye protection, they should be of polycarbonate plastic or CR-39 as in definition E.

5. All one-eyed participants (definition F) in collision-contact sports should have eye protection conforming to definitions A through D.

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GUIDE LINE 4c
Use of Trampoline and Minitramp

June 1978 • Revised June 1998

In 1978, the American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD) took the position that the use of the trampoline in physical education class apparently does not constitute an unreasonable risk of serious injury provided a number of controls are ensured. In 1981, the American Academy of Pediatrics (AAP), although not endorsing the use of the trampoline, supported a trial period of limited and controlled use by schools with careful assessment of the incidence and severity of injury during this trial period. Both organizations suggested certain guidelines for the use of the trampoline in developing sports skills.

The NCAA recognizes that the coaches and student-athletes in selected sports use the trampoline and minitramp for developing skills. The apparent safety record accompanying such use has been good, but the use of the trampoline can be dangerous. Therefore, these guidelines should be followed in those training activities in which student-athletes use the trampoline:

1. Trampolines should be supervised by persons with competence in the use of the trampoline for developing athletics skills. This implies that:

a. Fellow coaches, student-athletes, managers, etc., are trained in the principles and techniques of spotting with the overhead harness, "bungee system" and/or hand spotting on the trampoline;

b. New skills involving somersaults should be learned while wearing an overhead safety harness. (Exception: Use of the overhead system is not recommended for low-level salto activities such as saltos from the knees or back.) Those persons controlling the safety harness should have the necessary strength, weight and training for that responsibility;

c. Skills being encouraged should be commensurate with the readiness of the student-athlete, and direct observation should confirm that the student-athlete is not exceeding his or her readiness; and

d. Spotters are aware of the particular skill or routine being practiced and are in an appropriate position to spot potential errors. Accurate communication is important to the successful use of these techniques.

2. Potential users of the trampoline should be taught proper procedures for folding, unfolding, transporting, storing and locking the trampoline.

3. The trampoline should be erected in accordance with manufacturer's instructions. It should be inspected regularly and maintained according to established standards. All inspection reports, including the date of inspection and name of inspector, should be kept on file.

Minitramp

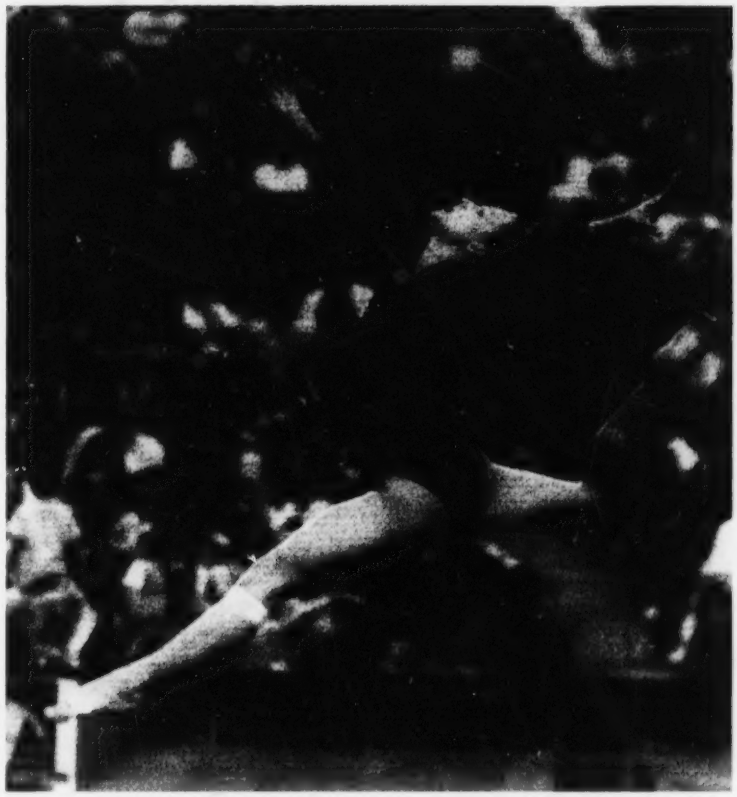
The minitramp, while different in nature and purpose from the trampoline, shares its association with risk of spinal cord injury from poorly executed and/or spotted tricks. Like the trampoline, the minitramp requires competent instruction and supervision, spotters trained for that purpose (spotting somersaults on the minitramp differs from the trampoline because of the running action preceding the somersault), emphasis on the danger of somersaults and dive rolls, security against unsupervised use, proper erection and maintenance of the apparatus, a planned procedure for emergency care should an accident occur, and documentation of participation and any accidents that occur. In addition, no single or multiple somersault should be attempted unless:

1. The student-athlete has demonstrated adequate progression of skill before attempting any somersault (i.e., on the trampoline with a safety harness, off a diving board into a swimming pool or tumbling with appropriate spotting);

2. One or more competent spotters who know the skill being attempted are in position and are physically capable of spotting an improper execution;

3. The minitramp is secured reasonably or braced to prevent slipping at the time of execution in accordance with recommendations in the USA Gymnastics Safety Handbook; and

4. A mat is used that is sufficiently wide and long to prevent the performer from landing on the mat's edge and to provide proper footing for the spotter(s).



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NCAA®
GUIDE LINE 4d
Mouth Guards

January 1986 • Revised August 1999

The NCAA Committee on Competitive Safeguards and Medical Aspects of Sports acknowledges the significant input of Dr. Jack Winters, past president of the Academy of Sports Dentistry, in the revision of this guideline.

The NCAA has mandatory equipment rules, including the use of mouthguards for selective sports. Various studies of "properly fitted mouthguards" indicate that they may reduce dental injuries and mild traumatic brain injuries (concussions) when blows to the jaws or head are received.

The American Dental Association has urged the mandatory use of mouth guards for those engaged in athletics activities that involve body contact and endorsed their use "in sporting activities where a significant risk of oral injury may occur." It is important when considering the optimum protection for an athlete that a thorough medical history be taken and the demands of his or her position and sporting activity be considered.

Specific objectives for the use of "properly fitted mouthguards" as protective devices in sports are as follows:

1. "Properly fitted mouthguards" could reduce the potential chipping of tooth enamel surfaces and reduce fractures of teeth, roots or bones.

2. "Properly fitted mouthguards" could protect the lip and cheek tissues from being impacted and lacerated against tooth edges.

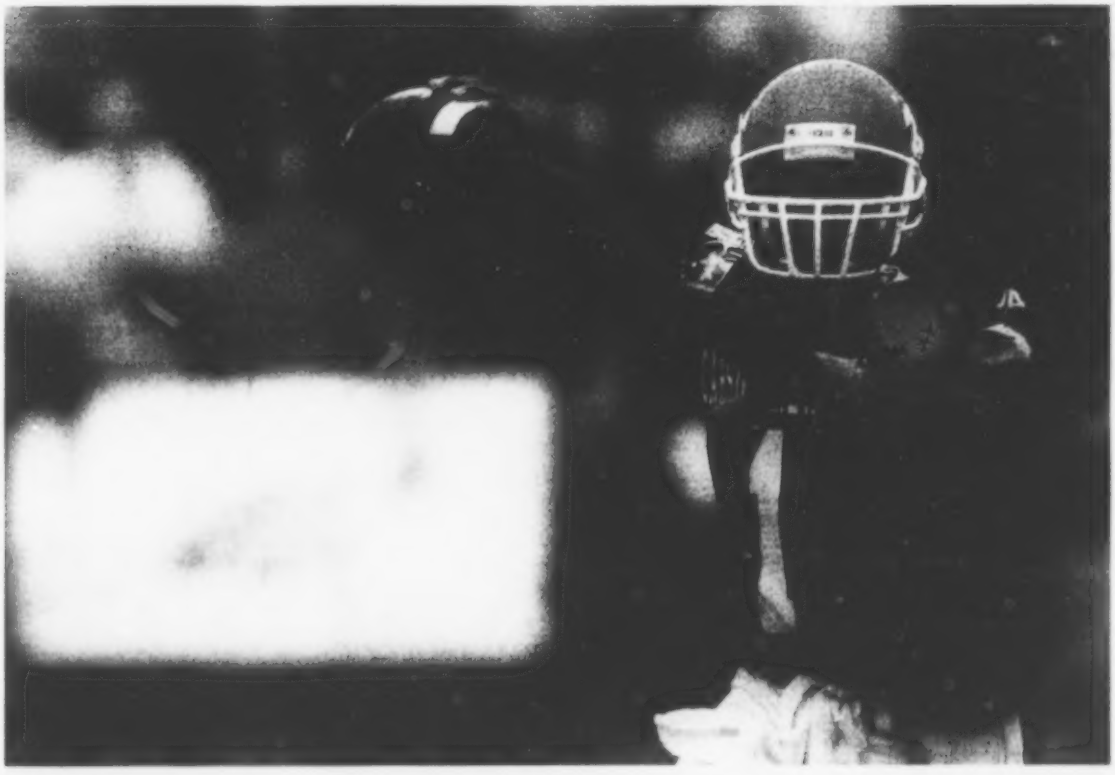
3. "Properly fitted mouthguards" could reduce the incidence of a fractured jaw caused by a blow delivered to the chin or head.

4. "Properly fitted mouthguards" could reduce the incidence of a mild traumatic brain injury (concussion) by possibly absorbing energy from a blow to the chin or head.

5. "Properly fitted mouthguards" could provide protection to toothless spaces, so support is given to the missing dentition of the athlete.

Stock, mouth formed and custom-fitted are three types of mouthguards recognized by the American Dental Association. All need to be properly fitted for maximum protection. Athletes should be advised as to which "properly fitted mouthguard" is best for them and how it is best maintained to assure the maximum fit and protection for daily practices and game-day wear. Medical staff personnel should regularly oversee and observe the athletes and the "properly fitted mouthguards."

In order to realize fully the benefits of wearing a mouth guard, the coach, student-athlete and medical staff need to be educated about the protective functions of a mouth guard and the game rules regarding mouth guard use must be enforced.



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NCAA®
GUIDE LINE 4e
Use of the Head as a Weapon in Football and Other Contact Sports

January 1976 • Revised June 1998

Serious head and neck injuries leading to death, permanent brain damage or quadriplegia (extensive paralysis from injury to the spinal cord at the neck level) occur each year in football. The number is relatively small but evident. Most of these catastrophic injuries result from initiating contact with the head. The injuries may not be prevented due to the tremendous forces occasionally encountered in football collisions, but they can be minimized by helmet manufacturers, coaches, players and officials complying with accepted safety standards and playing rules.

The American Football Coaches Association, emphasizing that the helmet is for the protection of the wearer and should not be used as a weapon, addresses this point as follows:

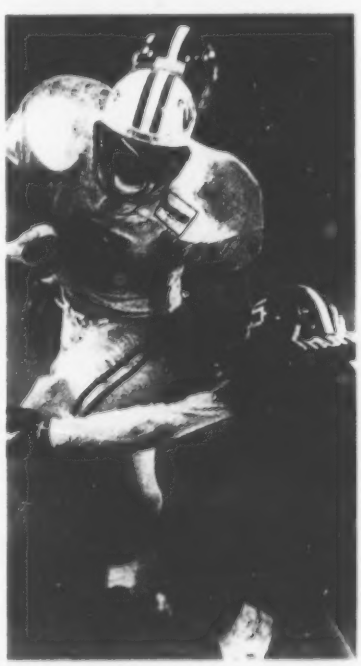
1. The helmet shall not be used as the brunt of contact in the teaching of blocking or tackling;

2. Self-propelled mechanical apparatuses shall not be used in the teaching of blocking and tackling, and

3. Greater emphasis by players, coaches and officials should be placed on eliminating spearing.

Proper training in tackling and blocking techniques constitutes an important means of minimizing the possibility of fatalities or catastrophic injury. Using the helmet as an offensive, injury-inflicting instrument should be discouraged.

Ice hockey, men's lacrosse and other contact sports also should be concerned with the prevention of catastrophic head injuries. The rules against butting, ramming and spearing with the helmet are for the protection of the helmeted player as well as the opponent. A player who does not comply with these rules in any sport is a candidate for a catastrophic or fatal injury.



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NCAA®
GUIDE LINE 4f
Guidelines for Helmet Fitting and Removal in Athletics

(adapted from Illinois State Medical Society guideline)

June 1990 • Revised June 1998

Several sports, including football, men's lacrosse and ice hockey, require wearing tight-fitting, similarly constructed helmets. The following guidelines, while focused on football, are applicable to periodic evaluation, fitting and removal of protective helmets worn in any sport. These guidelines represent minimal standards of care that are designed to assist physicians, coaches, athletic trainers, student athletic trainers, paramedics, EMTs and hospital personnel who care for student-athletes.

Medical coverage of interscholastic and intercollegiate football teams entails many routine preventive and acute health-care duties for dedicated practicing professionals; however, an occasional, serious, on-the-field, life-threatening head and/or neck injury poses a difficult challenge. It is incumbent upon those individuals assigned to provide medical coverage to be prepared to handle each situation efficiently and expertly.

Proper on-the-field management of head and neck injuries is essential to minimize sequelae, expedite emergency measures and to prepare for transportation. The action of those in attendance must not compound the problem. For this reason, clear communication between the medical staff and emergency-transportation personnel should be maintained.

It is important that those involved in the medical management of teams engaged in collision sports like football, as well as the student-athlete, be knowledgeable about the helmet. The student-athlete should be instructed in the fitting, care and use of the helmet.

The resilient plastic shell is shaped spherically to deflect impacts. Interior suspension pads are designed to match the skull contour to ensure a snug crown fit. Various rigid and removable jaw and brow pads, along with the double-snap chin strap, help to hold the sides of the helmet firmly against the mandible and the forehead. When in place, the front edge of the helmet should be positioned about a finger's breadth above the eyebrows. Pressure on the helmet crown should be dissipated through the interior suspension padding over the top of the head.

The helmet should fit snugly without dependence on the chin strap. The helmet should not twist or slide when an examiner grasps the face mask and attempts to rock or turn the helmet with the wearer resisting the movement.

With a properly fitted helmet, the top of the head is separated from the helmet shell by a uniform, functional, shock-absorbing support lining. Daily evaluation of this support mechanism, including cheek and brow pads, for placement and resiliency should be taught to the student-athlete. Helmets that require air inflation should be inflated and inspected daily by those assigned to equipment care. Helmet shells should be examined weekly for cracking and be inspected closely again if the face mask has been bent out of shape. All helmets need to be reconditioned and the plastic loop attachments of the swing-away mask replaced on a yearly basis.

Although the helmet is designed for a stable fit for protection during play, removal of the helmet by others is relatively difficult. In the case of a head or neck injury, jostling and pulling during removal presents high potential for further trauma.

Unless there are special circumstances such as respiratory distress coupled with an inability to access the airway, the helmet should never be removed during the prehospital care of the athlete with a potential head/neck injury unless:

1. The helmet does not hold the head securely, such that immobilization of the helmet does not immobilize the head;

2. The design of the sport helmet is such that even after removal of

the facemask, the airway cannot be controlled or ventilation provided;

3. After a reasonable period of time, the facemask cannot be removed; or

4. The helmet prevents immobilization for transportation in an appropriate position.

When such helmet removal is necessary in any setting, it should be performed only by personnel trained in this procedure.

Ordinarily, it is not necessary to remove the helmet on the field to evaluate the scalp. Also, the helmet can be left in place when evaluating an unconscious student-athlete, an individual who demonstrates transient or persistent neurological findings in his extremities, or the student-athlete who complains of continuous or transient neck pain.

Before the injured student-athlete is moved, airway, breathing and circulation (ABCs) should be evaluated by looking, listening and palpation. To monitor breathing, care for facial injury, or prior to transport regardless of current respiratory status, the facemask can be swung away by cutting the plastic loops that attach the mask to the helmet. These loops may be difficult to cut, necessitating the use of PVC pipe cutters or garden shears. Those involved in the prehospital care of the injured athlete should have readily-available proper tools for easy facemask removal and should frequently practice removal techniques for facemasks and helmets. A sharp pocket knife or scalpel may suffice. It should be noted that cold weather and old loops may make cutting difficult. The chin strap can be left in place unless resuscitative efforts are necessary. For resuscitation, the mouthpiece needs to be manually removed and a fingerswipe made of the mouth.

Once the ABCs are stabilized, transportation to an emergency facility by an experienced crew demands that the head be secure in the helmet and the neck immobilized by strapping, taping and/or using lightweight bolsters on a spine board. Care is needed to skillfully complete this maneuver to provide a stable unit of head, neck and spine. When moving an athlete to the spine board, the head and trunk should be moved as a unit, using the lift/slide maneuver.

At the emergency facility, satisfactory initial skull and cervical X-rays usually can be obtained with the helmet in place. Should removal of the helmet be needed to initiate treatment or to obtain special X-rays, specific protocol needs to be followed. With the head, neck and helmet manually stabilized, the chin strap can be cut. While maintaining stability, the cheek pads can be removed by slipping the flat blade of a screwdriver or bandage scissor under the pad snaps and above the inner surface of the shell. While another individual provides manual stability of the chin and neck, the persons stabilizing the head place their thumbs or index fingers into the earholes on both sides. By pulling both laterally and longitudinally, the helmet shell can be spread and eased off. Should a rocking motion be necessary to loosen the helmet, the head/neck unit must not be allowed to move. Those individuals participating in this important maneuver must proceed with caution and coordinate every move.

If the injured student-athlete, after being rehabilitated fully, is allowed to participate in the sport again, refitting his helmet is mandatory. Re-education about helmet use as protection should be conducted. Using the helmet as an offensive, injury-inflicting instrument should be discouraged.

#473

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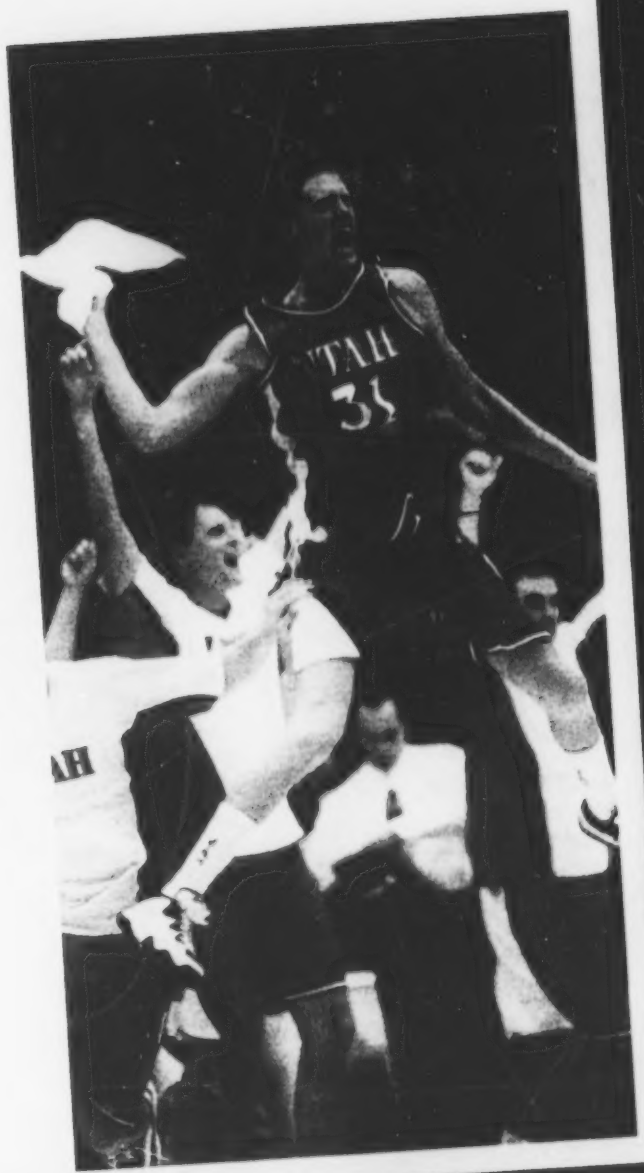

SPORTS SCIENCES

APPENDICES

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APPENDIX A

NCAA Injury Surveillance System Summary

The NCAA Injury Surveillance System (ISS) was developed in 1982 to provide current and reliable data on injury trends in intercollegiate athletics. Injury data are collected yearly from a representative sample of NCAA member institutions, and the resulting data summaries are reviewed by the NCAA Committee on Competitive Safeguards and Medical Aspects of Sports. The committee's goal continues to be to reduce injury rates through suggested changes in rules, protective equipment or coaching techniques, based on data provided by the ISS.

Sampling

Participation in the ISS is voluntary and limited to the 931 member institutions (as of July 1998). ISS participants are selected from the population of institutions sponsoring a given sport. Selections are random within the constraints of having a minimum 10 percent representation of each NCAA division (I, II and III) and region (East, South, Midwest, West). It is important to emphasize that this system does not identify every injury that occurs at NCAA institutions in a particular sport. Rather, it collects a sampling that is representative of a national cross section of NCAA institutions.

Injuries

A reportable injury in the ISS is defined as one that:

1. Occurs as a result of participation in an organized intercollegiate practice or game;

2. Requires medical attention by a team athletic trainer or physician, and

3. Results in restriction of the student-athlete's participation or performance for one or more days beyond the day of injury.

Exposures

An athlete exposure (A-E), the unit of risk in the ISS, is defined as one athlete participating in one practice or contest where he or she is exposed to the possibility of athletics injury.

Injury Rate

An injury rate is simply a ratio of the number of injuries in a particular category to the number of athlete exposures in that category. In the ISS, this value is expressed as injuries per 1,000 athlete exposures.

All Sports Figures

The following figures outline selected information from the 16 sports currently monitored by the ISS.

Figure Nos. 1-3 compare the practice and game injuries across 16 sports without regard to severity. Comparisons of injury rates between sports are difficult because each sport has its own unique schedule and activities. If such comparisons are necessary, it may be best to use the game data for which the **intensity** variable is most consistent.

Figure Nos. 4-7 examine two measures of severity found in the ISS—time loss and injuries that required surgery. These combined practice and game data are presented to assist in decision regarding appropriate medical coverage for a sport; however, each severity category has some limitations that should be considered.

1. Time loss—Figure Nos. 4 and 5 evaluate the percentage or rate of reported injuries that caused restricted or loss of participation of seven days or more. Limitations to this type of severity evaluation include:

a. An injury that restricts participation in one sport may not restrict participation in another sport, and

b. Injuries that occur at an end of the season can only be estimated with regard to time loss.

2. Injuries that require surgery—Figure Nos. 6 and 7 evaluate the

percentage or rate of reported injuries that required either immediate or postseason surgery. Limitations to this severity evaluation include:

a. The changing nature of surgical techniques and how they are applied;

b. The assumption that all sports had access to the same quality of medical evaluation; and

c. Injuries can occur that may be categorized as severe, such as concussions, that may not require surgery.

Any questions regarding the ISS or its data reports should be directed to: Randall W. Dick, assistant director of health and safety, NCAA, P.O. Box 6222, Indianapolis, Indiana 46206-6222 (317/917-6222).

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Figure 1
Practice Injury Rate Summary (All Sports)

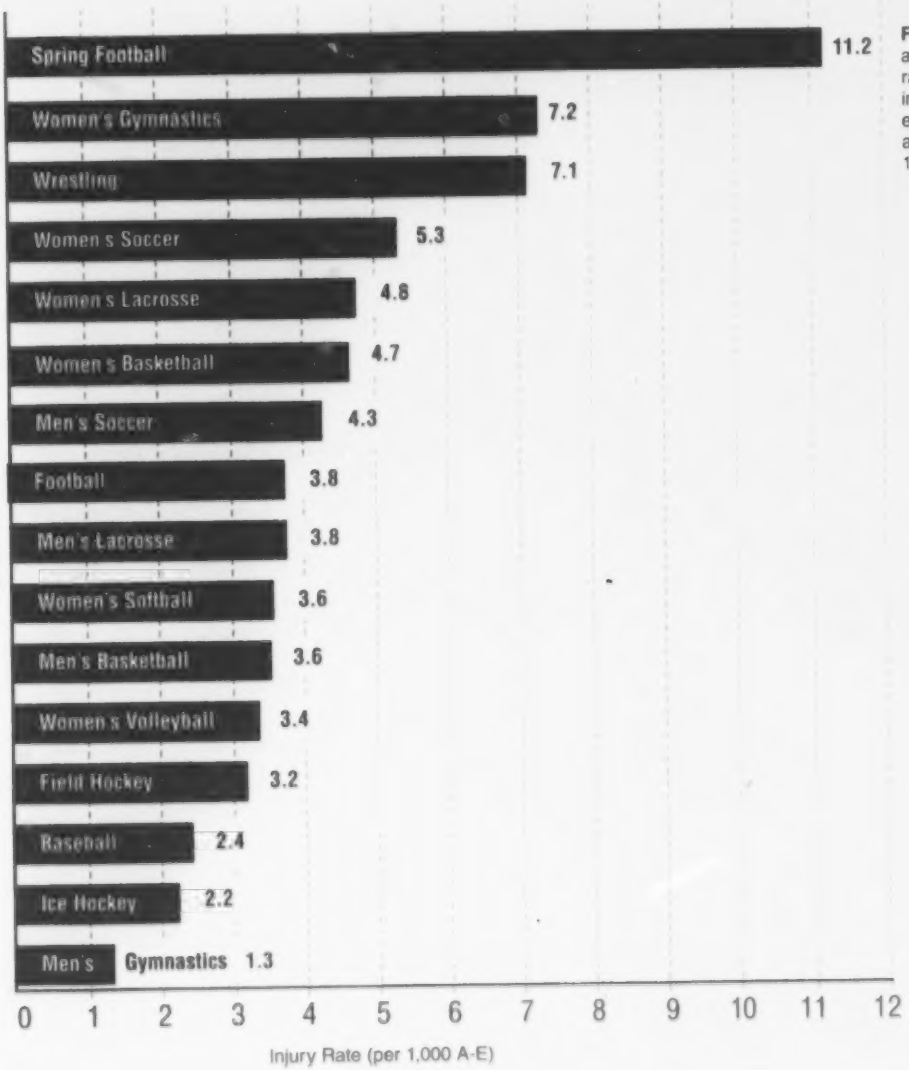

Figure 1 represents the average practice injury rate (expressed as injuries per 1,000 athlete-exposures) for all sports analyzed in the ISS in the 1997-98 season.

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Figure 2
Game Injury Rate Summary (All Sports)

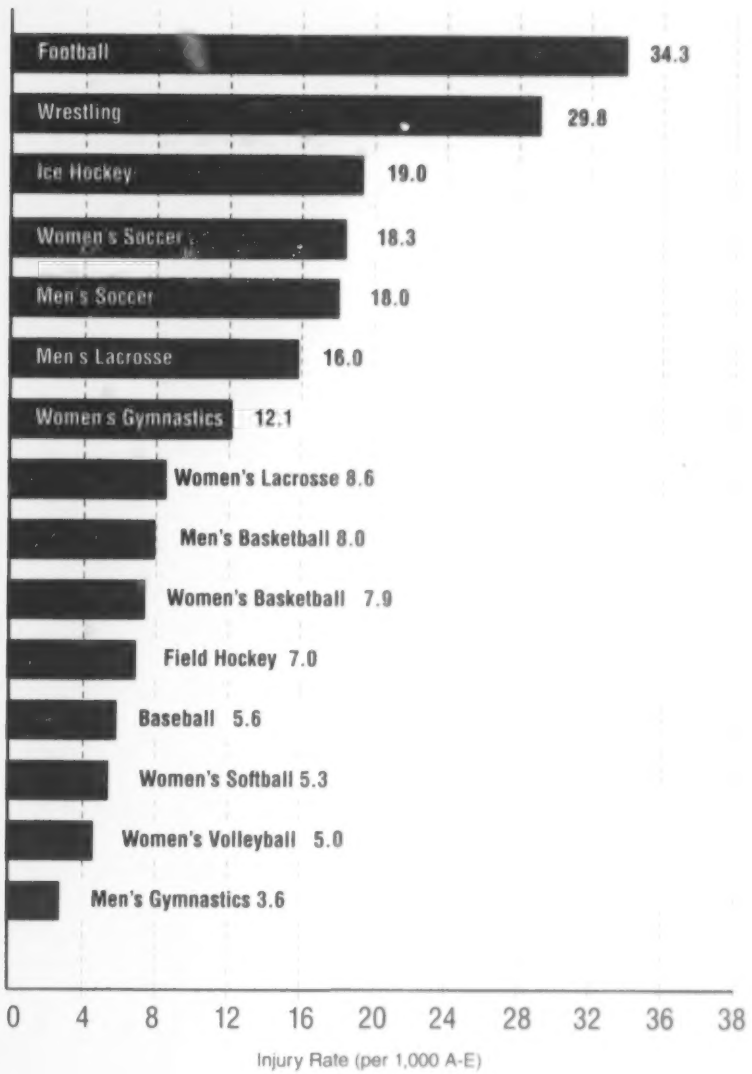

Figure 2 represents the average game injury rate (expressed as injuries per 1,000 athlete-exposures) for all sports analyzed in the ISS in the 1997-98 season.

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Figure 3
Percentage of All Injuries Occurring in Practices and Games

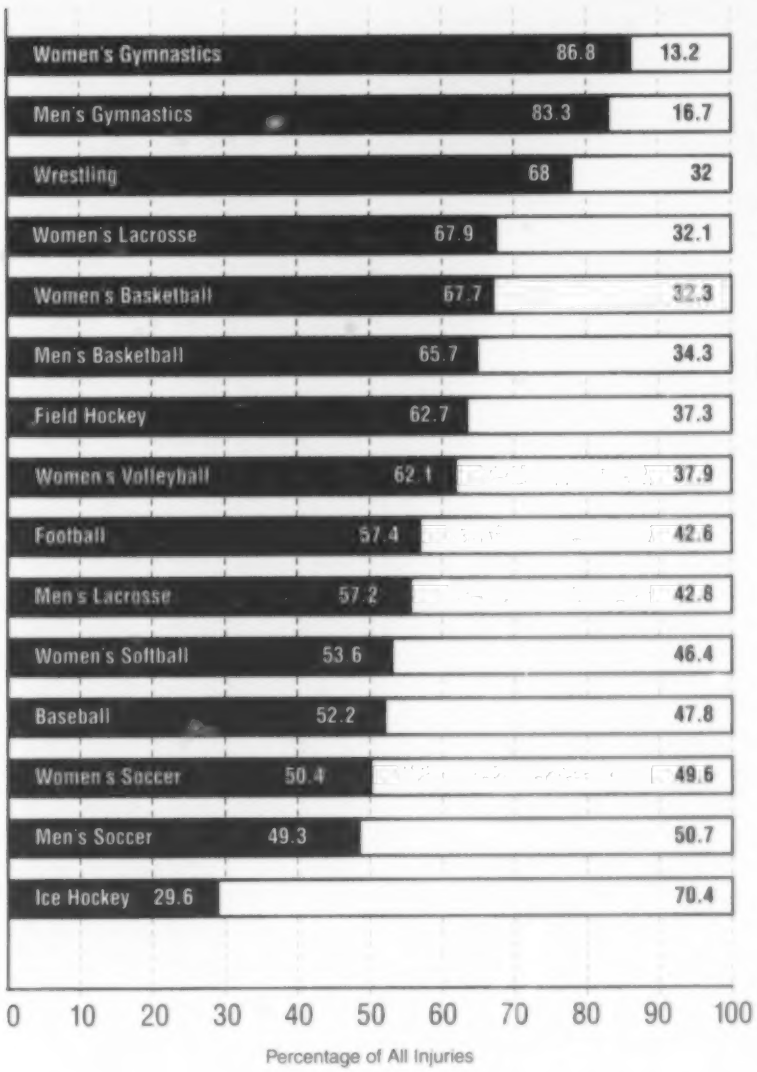

Figure 3 represents the percentage of all injuries that occurred in practices and in games in the 1997-98 season. The relatively few injuries that occurred in the weight room were not included in the practice and game percentages. It should be noted that these calculations are based only on the absolute number of injuries and do not take exposures into consideration.

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Figure 4

SEVERITY - Practice Injuries Resulting in 7+ Days of Time Loss (Injury Rate)

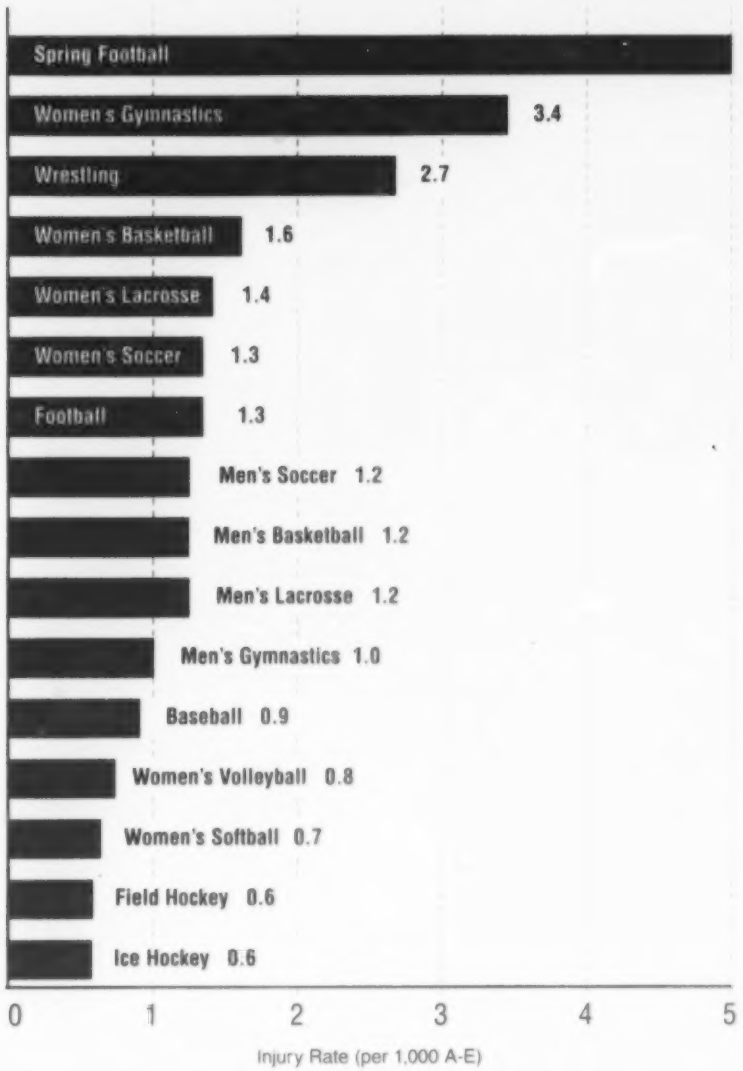

Figure 4 represents a measure of injury severity (time loss) in PRACTICE across all sports analyzed in the ISS in the 1997-98 season. Specifically, the rate of all injuries that caused restricted or missed participation for seven or more days are reported.

Figure 5
SEVERITY - Game Injuries Resulting in 7+ Days of Time Loss
(Injury Rate)

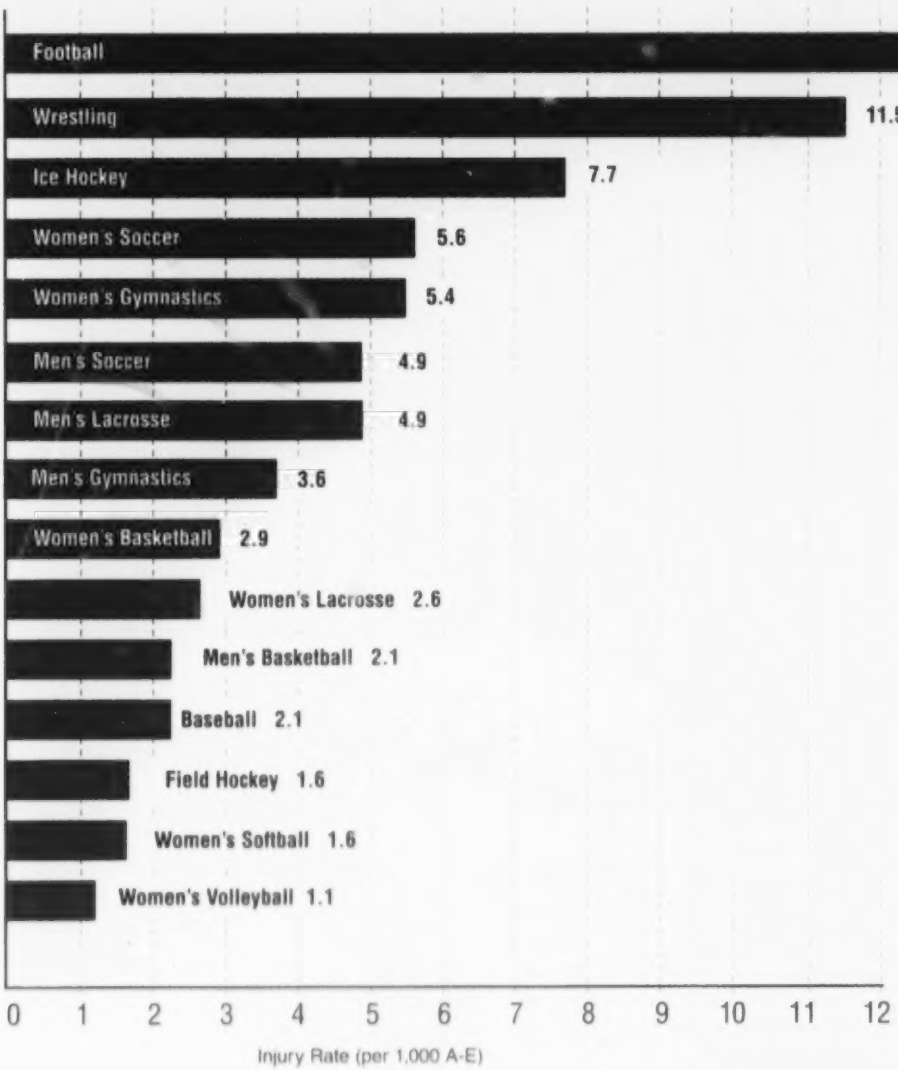

Figure 5 also represents the time-loss variable across all sports. Specifically, the GAME rate of injuries that caused restricted or missed participation for seven or more days is reported.

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Figure 6

SEVERITY - Practice Injuries Requiring Surgery (Injury Rate)

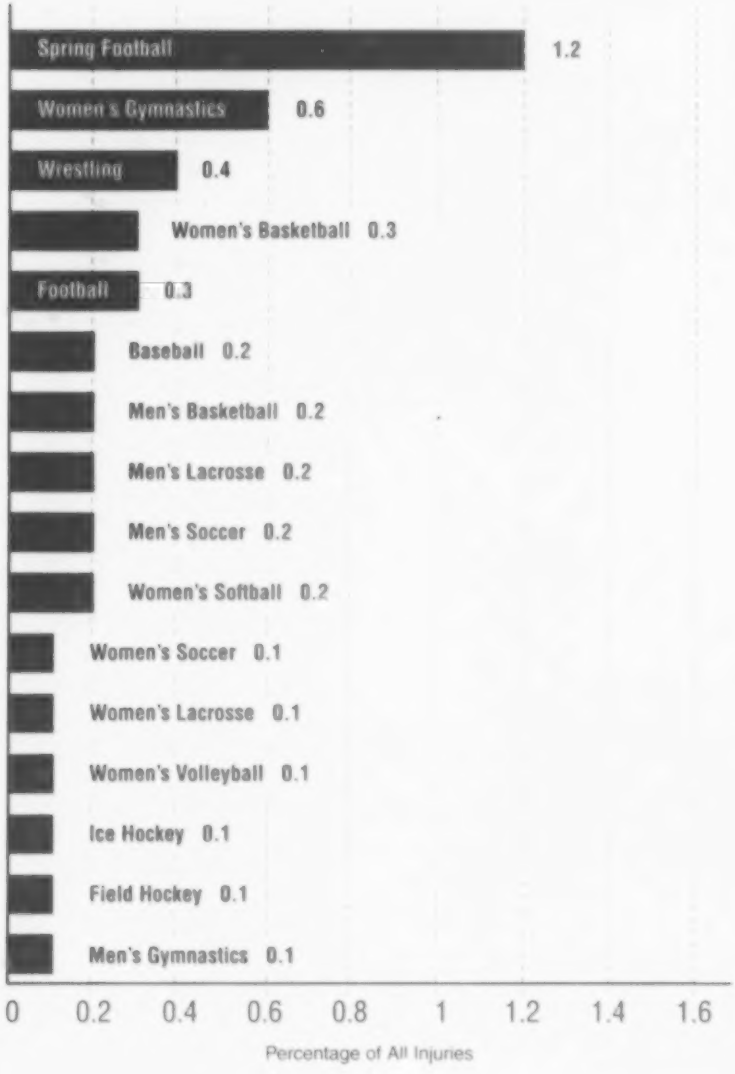


Figure 6 represents the PRACTICE rate of reported injuries requiring surgery across all sports analyzed in the ISS in the 1997-98 season.

Figure 7
SEVERITY - Injuries Requiring Surgery
(Injury Rate)

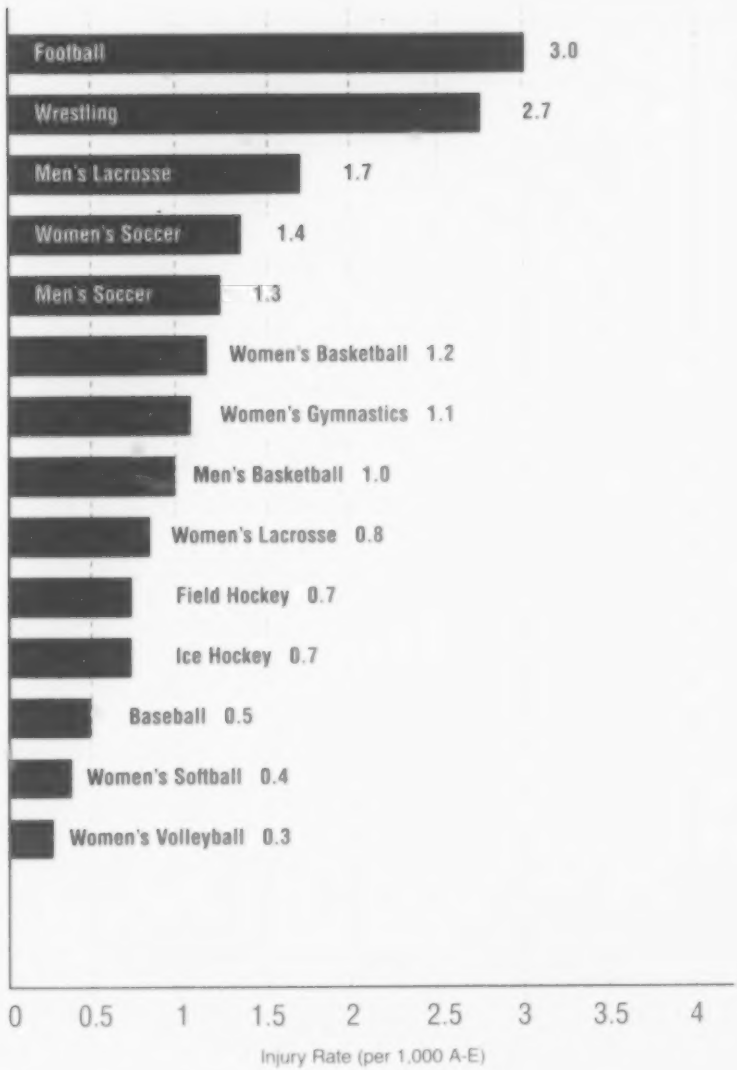
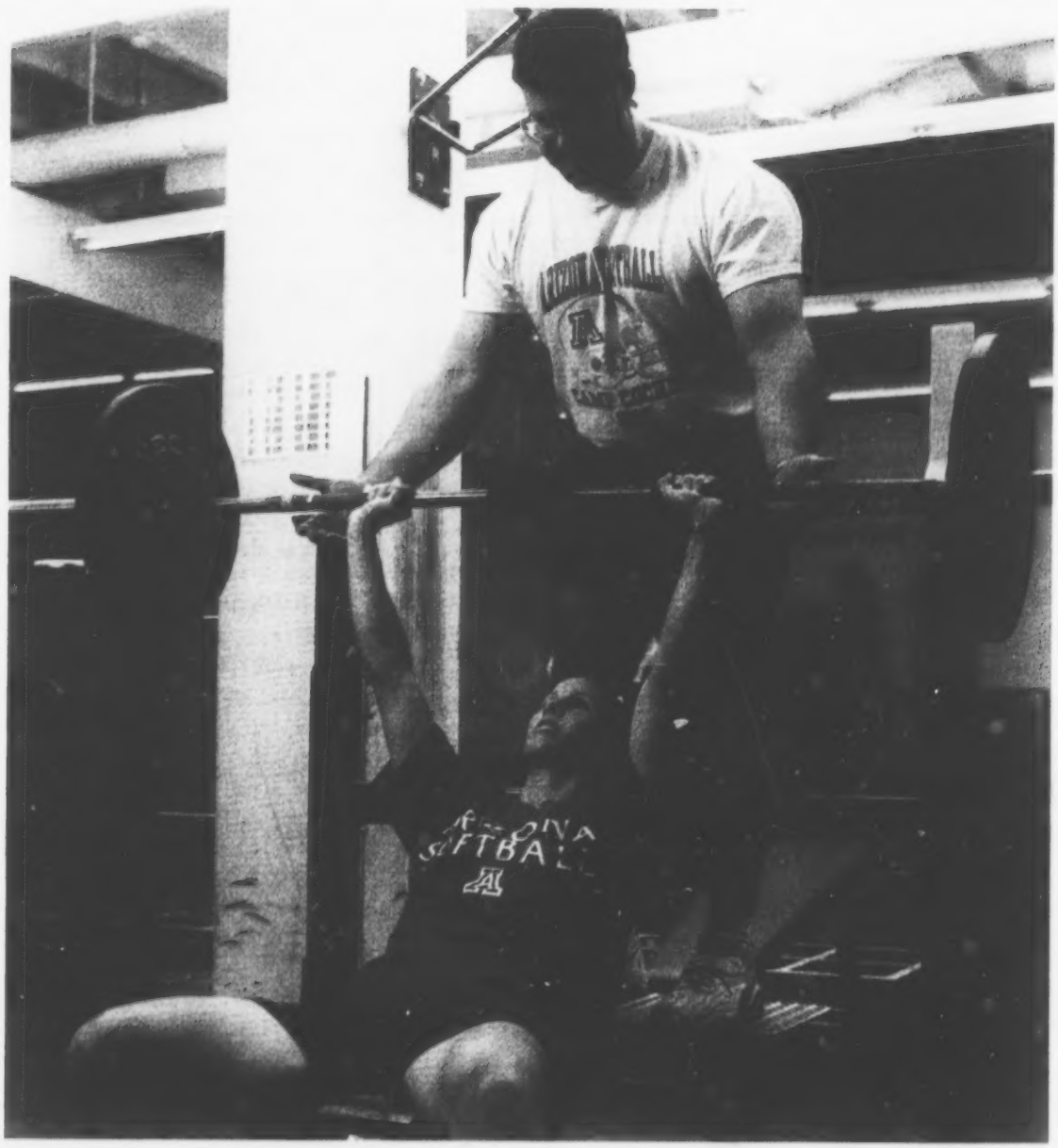


Figure 7 represents the GAME rate of reported injuries requiring surgery.



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APPENDIX B
Acknowledgements

From 1974 to 1999, the following individuals have served on the NCAA Committee on Competitive Safeguards and Medical Aspects of Sports and contributed to the information in the NCAA Sports Medicine Handbook:

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